

Economic Data Collection Program
Catcher Vessel Report (2009-2016)

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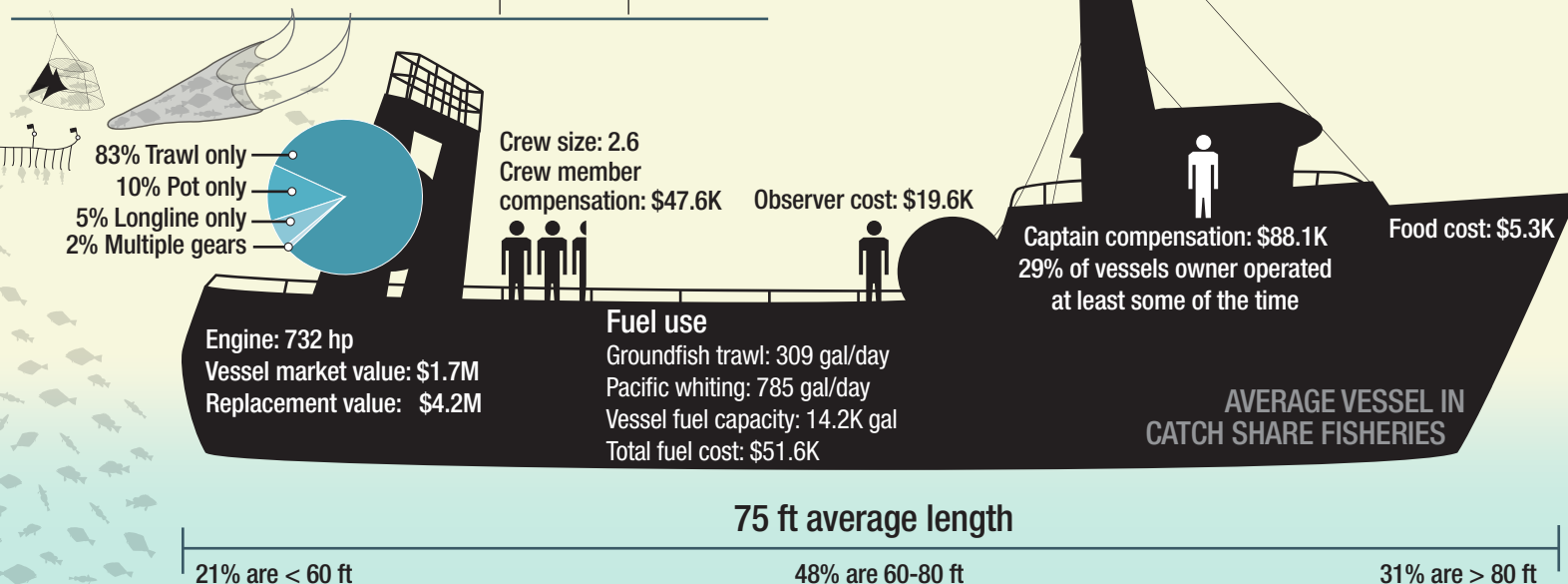
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CATCHER VESSELS

FISHERY PARTICIPATION

		Vessels	Avg Days at Sea	Total Landings (1000s mt)
CATCH SHARE FISHERIES	At-sea Pacific whiting	17	74.8	65.5
	Shoreside Pacific whiting	23	64.6	86.2
	Non-whiting midwater	9	11.3	1.9
	DTS trawl (with trawl endorsement)	50	33.1	11.2
	Non-whiting, non-DTS trawl (with trawl endorsement)	47	25.1	5.6
	Groundfish fixed gear (with trawl endorsement)	19	29.7	1.0
	Crab	46	35.1	2.1
	Shrimp	27	53.2	6.4
	Other fisheries	16	31.9	0.5
	Alaska	23	105.8	93.8
	Research	6	7.1	0.9



ECONOMIC SUMMARY*

Vessel Average

\$594.0K revenue
\$343.7K variable costs
\$250.3K variable cost net revenue
\$100.7K fixed costs
\$149.7K total cost net revenue

\$4.1K variable cost net revenue per day

Fleet-wide Totals

97 vessels
\$57.6M revenue
\$24.3M variable cost net revenue
\$14.5M total cost net revenue

ALASKA PARTICIPATION

Alaska: \$37.7M
26 vessels

AT-SEA PARTICIPATION

At-sea: \$10.6M
17 vessels

SHORESIDE PARTICIPATION

Total value of catch share groundfish landings
Vessel ports

South & central Washington, Puget Sound: \$6.0M
17 vessels

Astoria: \$23.5M
35 vessels

Newport: \$11.3M
24 vessels

Coos Bay } \$4.7M
Brookings } 19 vessels

Crescent City } \$6.0M
Eureka } 15 vessels

Fort Bragg

San Francisco:

Monterey

\$1.8M
9 vessels

Morro Bay

Santa Barbara

*Note that some off-board costs are not collected. Therefore reported net revenue is an overestimate of actual net revenue.

Catcher Vessel Sector: 2016 Highlights

In 2016, the sixth year of the catch share program, there were 97 catcher vessels that participated in the West Coast groundfish trawl catch share program (catch share program).

- Catcher vessels generated \$78.7 million in income and 711 jobs from deliveries of fish caught in the catch share program.
- Catcher vessels spent an average of 64 days fishing in the catch share program and spent an average of 75 additional days fishing in non-catch share fisheries, including fishing in Alaska.
- West Coast catcher vessels deliver to ports in Washington, Oregon, California, and to mothership at-sea; the two ports with the highest landings revenue in 2016 were Astoria and Newport, both in Oregon.
- An average of 2.6 crew members worked aboard each West Coast catcher vessel, each earning an average compensation of \$48,200.
- In 2016, 29% of vessels were owner-operated at least part of the year.
- The average ex-vessel revenue per vessel from participation in the catch share program was \$594,000.
- Average catch shares variable cost net revenue (ex-vessel revenue minus variable costs) per vessel was \$250,000, and the fleet-wide variable cost net revenue was \$24.2 million.
- Average total cost net revenue (ex-vessel revenue minus variable costs and fixed costs) per vessel was \$149,000 and the fleet-wide total cost net revenue was \$14.5 million.
- Between 2011 and 2016, average variable cost net revenue was between 6.9% and 20.7% lower when quota costs and earnings were included.

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Report Introduction

About the Report

The US West Coast groundfish fishery takes place off the coasts of Washington, Oregon and California, and comprises over 90 different species of fish. Fish are harvested both commercially and recreationally. The commercial fishery has four components: limited entry with a trawl endorsement, limited entry with a fixed gear endorsement, open access, and tribal. In January 2011, the West Coast Limited Entry groundfish trawl fishery transitioned to the West Coast groundfish trawl catch share program. The catch share program consists of cooperatives for the at-sea mothership (including catcher vessels and motherships) and catcher-processor fleets, and an individual fishing quota (IFQ) program for the shorebased trawl fleet.¹

The Economic Data Collection (EDC) Program is a mandatory component of the West Coast groundfish trawl catch share program, collecting information annually from all catch share participants: catcher-processors, catcher vessels, motherships, first receivers, and shorebased processors. The EDC information is used to monitor the economic effects of the catch share program, and consists of data on operating costs, revenues, and vessel and processing facility characteristics.

This report summarizes information collected from the West Coast catcher vessel fleet. The EDC reports are also produced for the other sectors, and currently cover the years 2009 to 2016. The 2009 and 2010 data were collected in 2011 to provide a baseline of pre-catch share information. There is a one-year lag in collecting the EDC data to allow companies to close their accounting books. Thus, 2016 data were collected from May to September 2017. The EDC reports are updated annually to disseminate the data and contextualize its interpretation. The reports also serve as a catalyst for feedback on the data collected and its analysis. The scope of these reports continues to expand and the methods are refined with each publication.

The report is composed of three major sections. The first section, Catcher Vessel Overview (beginning on page 8), is an in-depth summary that contains descriptive analyses focusing on activities during 2016. The second section, Catcher Vessel Data Summaries (beginning on page 54), provides tables of all of the data collected from 2009 to 2016, with a detailed discussion of the methods used to summarize the data. The third section, Catcher Vessel Data Analysis (beginning on page 134), contains information about cost disaggregation and calculations of net revenue and economic performance. The data that form the basis for this report are confidential and must be aggregated or not shown so that individual responses are protected. More information about EDC Program administration, the EDC forms, data quality controls, data processing, and safeguarding confidential information can be found in the EDC Administration and Operations Report.²

Background - Economic Data Collection and West Coast Groundfish Trawl Catch Share Program

The economic benefits of the West Coast groundfish trawl fishery and the distribution of these benefits were expected to change under the West Coast groundfish trawl catch share program. To monitor these changes, the Pacific Fishery Management Council (PFMC) proposed the implementation of the mandatory collection of

¹ Information about the Catch Share Program is available at http://www.westcoast.fisheries.noaa.gov/fisheries/groundfish_catch_shares/.

² Economic Data Collection Program, Administration and Operations Report available at: <http://www.nwfsc.noaa.gov/edc>.

economic data. Using data collected from industry participants, the EDC Program monitors whether the goals of the catch share program have been met.

Many of the PFMC's goals for the catch share program are economic in nature. These goals include: provide for a viable, profitable, and efficient groundfish fishery; increase operational flexibility; minimize adverse effects from an IFQ program on fishing communities and other fisheries to the extent practical; promote measurable economic and employment benefits through the harvesting, processing, distribution, and support sectors of the industry; provide quality product for the consumer; and, increase safety in the fishery.

The EDC Program is also intended to help meet the Magnuson-Stevens Fishery Conservation and Management Act (MSA) requirement to determine whether a catch share program is meeting its goals, and whether there are any necessary modifications of the program to meet those goals. The data submitted to and analyzed by the EDC Program were fundamental to the formal 5-year review of the catch share program required under the MSA, finalized in early 2018.

Monitoring the economic effects of a catch share program requires a variety of economic data and analyses. The primary effects of a catch share program can be captured in two broad types of economic analysis: 1) economic performance measures, and 2) regional economic impact analysis. Both of these require information on the costs and earnings of harvesters and processors.

Economic performance measures include: costs, earnings, and profitability (net revenue); economic efficiency; capacity measures; economic stability; net benefits to society; distribution of net benefits; product quality; functioning of the quota market; incentives to reduce bycatch; market power; and, spillover effects in other fisheries. Some of these measures are presented in this report, while others would require more specific and involved analysis using EDC data.

Regional economic impact analysis measures the effects of the program on regional economies. The catch share program will likely affect different regional economies in different ways. Regional economic modeling involves tracking the expenditures of all businesses, households, and institutions within a given geographic region to arrive at the effects on income and employment. On the West Coast, the Northwest Fishery Science Center's IO-PAC model³ is used to estimate regional economic impacts using data from both the EDC survey forms and the voluntary cost earnings survey as model inputs.⁴

³ Leonard, J., and P. Watson. 2011. Description of the input-output model for Pacific Coast fisheries. U.S. Dept. Commer., NOAA Tech. Memo. NMFS-NWFSC-111, 64 p.

⁴ For more information on cost earnings survey data collection process, see the Administration and Operations Report Draft Report (May 2016).

OVERVIEW

Management context

In January 2011, the West Coast limited entry groundfish trawl fishery transitioned to the West Coast Groundfish Trawl Catch Share Program. The catch share program consists of cooperatives for the at-sea mothership (including catcher vessels and motherships) and catcher-processor fleets, and an individual fishing quota (IFQ) program for the shorebased trawl fleet. The catcher vessels participating in the IFQ program deliver shoreside to buyers and processors with first receiver site licenses and at-sea cooperative vessels deliver to mothership vessels.

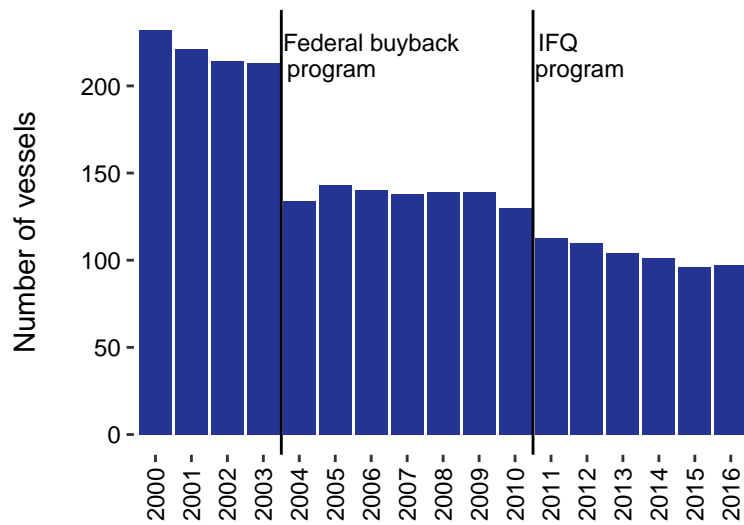


Figure 1: Number of catcher vessels participating in the At-sea and Shoreside limited entry trawl groundfish fisheries (2000-2010) and the number of vessels participating in the West Coast Groundfish Trawl Catch Share Program (2011-2016).

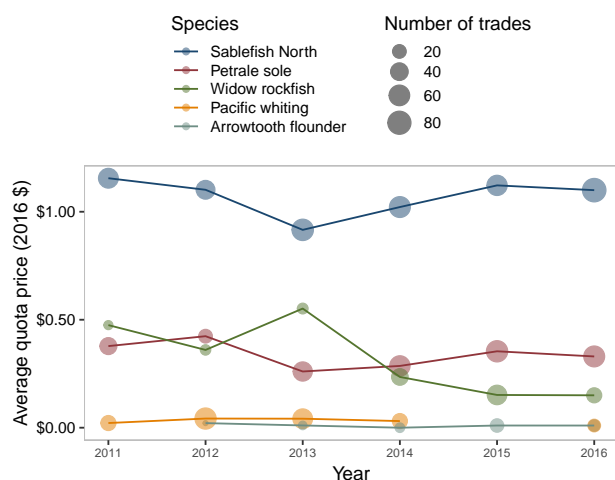
2004 (post-buyback program) and 2010 (pre-catch share program). In 2011, the first year of the catch share program, the number decreased to 113, with the lowest number of vessels to date in 2016 (97 vessels).

The NMFS has mandatory rebuilding plans that limit bycatch for species that are designated “overfished.” There was only two rockfish species that remain designated as overfished as of 2017: yelloweye rockfish and cowcod

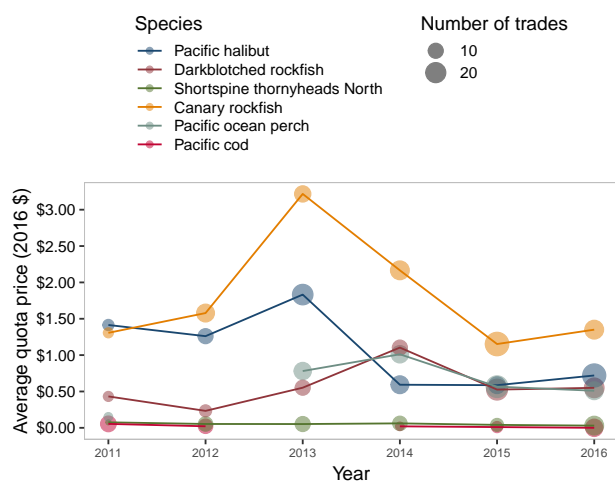
¹ A detailed history of the fishery can be found here: Warlick, A., E. Steiner, and M. Guldin. 2018. History of the West Coast Groundfish Trawl Fishery: Tracking Socioeconomic Characteristics across Different Management Policies in a Multispecies Fishery. *Marine Policy* 93 (July): 9-21. doi:10.1016/j.marpol.2018.03.014.

² 68 FR 42613, available at www.federalregister.gov/articles/2003/07/18/03-18344/magnuson-stevens-act-provisions-fishing-capacity-reduction-program-pacific-coast-groundfish-fishery.

rockfish.³ In 2011, widow rockfish was taken off the overfished list.⁴ As a result, the annual catch limit (ACL) for widow rockfish was raised in 2013. Similarly, canary rockfish was taken off the overfished list in 2015.⁵ The coast-wide ACL for widow rockfish was increased from 2,000 metric tons in 2015 and 2016 to 13,508 metric tons for 2017; and canary rockfish ACL only increased from 122 to 125 metric tons in 2016, but increased to 1,526 for 2017.



(a) Quota prices for IFQ target species.



(b) Quota prices for IFQ bycatch species.

Figure 2: Quota prices for IFQ target and bycatch species with the highest number of transactions per year. The size of the circle represents the number of trades included in the price calculation.

Prior to 2011, the fishery was managed with a system that included trip and landings limits, area restrictions, seasonal closures, and gear restrictions. Many of these measures were developed to assist in the rebuilding of seven species that are caught as targets or bycatch in the groundfish fishery and were declared overfished by 2003. The catch share program was designed to alleviate the restrictive, inflexible nature of trip and landings limits, which limited the landings of groundfish species by two-month periods. Landings limits tend to encourage discarding, which can be detrimental to the rebuilding of overfished species. Under the catch share program, vessels holding a limited entry trawl permit were allocated individual quota shares.

Quota shares were allocated for 30 different groundfish species and rockfish complexes to permit owners based on their historical participation.⁶ Annually, the quota shares are converted into quota pounds, which are then used by vessels to harvest fish within the catch share program. The quota shares and quota pounds are transferable through lease arrangements and sale, and are infinitely divisible.⁷ The catch share program allows vessels to catch their quota at any time during the season. One hundred percent at-sea observer coverage – another feature of the program – ensures that all catch, including discards, is counted against a vessel's quota pounds.

Just as all quota for target species are allocated to individuals, so are quota for the overfished species. If an individual is unable to cover catch of overfished species with their existing quota, they are prohibited from fishing. In response to the consequences related

³ 2019 and 2020 groundfish harvest specifications under default harvest control rules: https://www.pcouncil.org/wp-content/uploads/2017/09/E9_SuppAtt6_2019-20HarvestSpex_SEPT2017BB-1.pdf

⁴ NMFS 2011. Status of the widow rockfish resource in 2011: http://www.pcouncil.org/wp-content/uploads/Widow_2011_Assessment.pdf.

⁵ NMFS 2015. Status of canary rockfish in the CA current in 2015: http://www.pcouncil.org/wp-content/uploads/2015/05/D8_Att1_Canary_2015_FULL-E-Only_JUN2015BB.pdf.

⁶ Additional information on the regulations, including the Federal Register notice, can be found at the West Coast Region website: www.westcoast.fisheries.noaa.gov/fisheries/groundfish_catch_shares/.

⁷ There was a moratorium on transfers of quota share percentages (permanent transfers of allocation) until January 1, 2015.

to catching a species without available quota, some vessels have formed risk pools. The risk pools minimize the risk of needing to prematurely end the fishing season by pooling quota of overfished species with other quota owners. The participants in some risk pools are contractually obligated to follow a set of fishing guidelines, and if the guidelines are followed, any catch of overfished species is covered by the pooled quota and the individual can continue fishing.

Within the catch share program, there are various ways that quota pounds can be traded. The types of trades most frequently recorded are self-trades, other, cash sales, and barter. The “other” category includes cases such as transfers involving risk pools and arrangements where there is no predetermined price, but instead the payment is a percentage of the ex-vessel value of the landed fish. Barter transactions generally refer to a “quota for quota” trade, where individuals trade quota they do not plan to fish themselves. In 2016, northern sablefish quota (North of 36°N) was traded the most frequently (\$1.10 per pound), followed by petrale sole quota (\$0.33), Pacific halibut (\$0.72), and widow rockfish (\$0.15)(Figure 2a). There were only six cash sales of southern sablefish quota (South of 36°N) in 2016. Unlike 2015 when there were no cash transactions for Pacific whiting, in 2016, there were 16 trades at an average price of \$0.01 per quota pound. Although more Dover sole is caught in the fishery than any other species besides Pacific whiting, there were no single species cash trades for Dover sole in 2016.⁸

Various factors have affected the utilization rate of Pacific whiting (Figure 3) in the at-sea and shoreside sectors. Pacific whiting approached full TAC attainment from 2009-2013. The TAC was underutilized in 2014, potentially a result of the trade embargo implemented by Russia.⁹ In 2015, Pacific whiting catch and TAC attainment was very low for both whiting sectors likely due in part to anomalous ocean conditions (termed “The Blob”) that caused ecosystem-wide changes impacting the spatial and temporal distribution of whiting and their prey. Utilization rates improved in 2016 in the At-sea sector, increasing from 39% in 2015 to 81% in 2016. Total catch for the sector was the highest since the implementation of the catch share program at 143 million pounds. In contrast, for the shoreside sector, the utilization rate was still quite low (61%) in 2016, but total catch was only 13.4% less than 2013 and 2014 levels (the highest catch since the implementation of the catch share program).

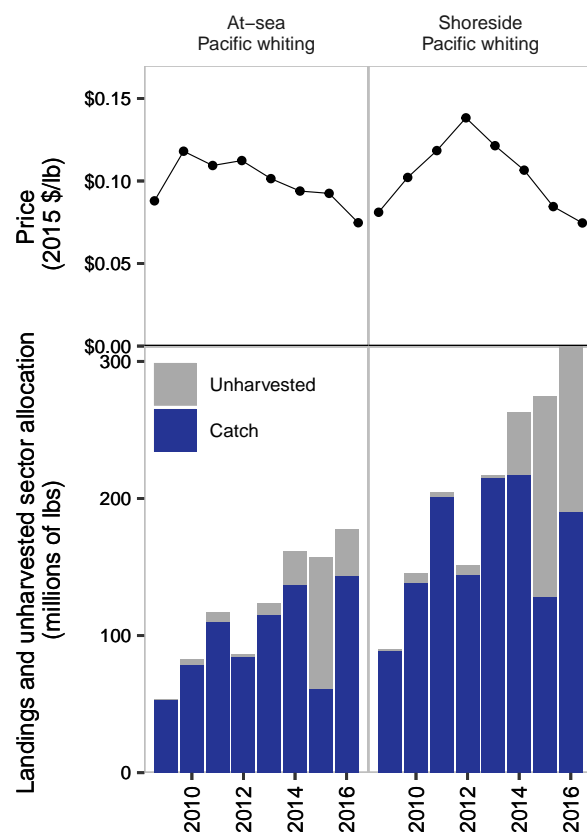


Figure 3: Landings and unharvested sector allocation and average ex-vessel prices (2016 \$) in the At-sea and Shoreside Pacific whiting sectors. Pacific whiting includes any reapportionment among sectors that may have occurred during the season.

⁸ Note that the prices reported here are based on a relatively small number of single species trades, which are less common than multispecies trades. See Holland, Daniel S. “Development of the Pacific Groundfish Trawl IFQ Market.” *Marine Resource Economics* 31, no. 4 (2016): 453-64.)

⁹ In 2014, there was a reapportionment of tribal allocation to the shoreside sector on October 23, 2014, however the quota were not distributed to vessel accounts because of salmon bycatch concerns, see 80 FR 12614. The unharvested sector allocation does not include the 18.5 million pounds that were not distributed as quota.

Trawl sector-specific allocations of the ACL were implemented for all species as part of the catch share program. Prior to the program, only sablefish and Pacific whiting had a sector-specific allocation. Since the implementation of the catch share program utilization of the ACL was low for many species, with the exception of sablefish and petrale sole (Figure 4). The utilization rates for many species, including thornyheads and dover sole have decreased since the implementation of the catch share program. This is the result of both an increase in the ACL as well as a decrease in the total catch of these species.

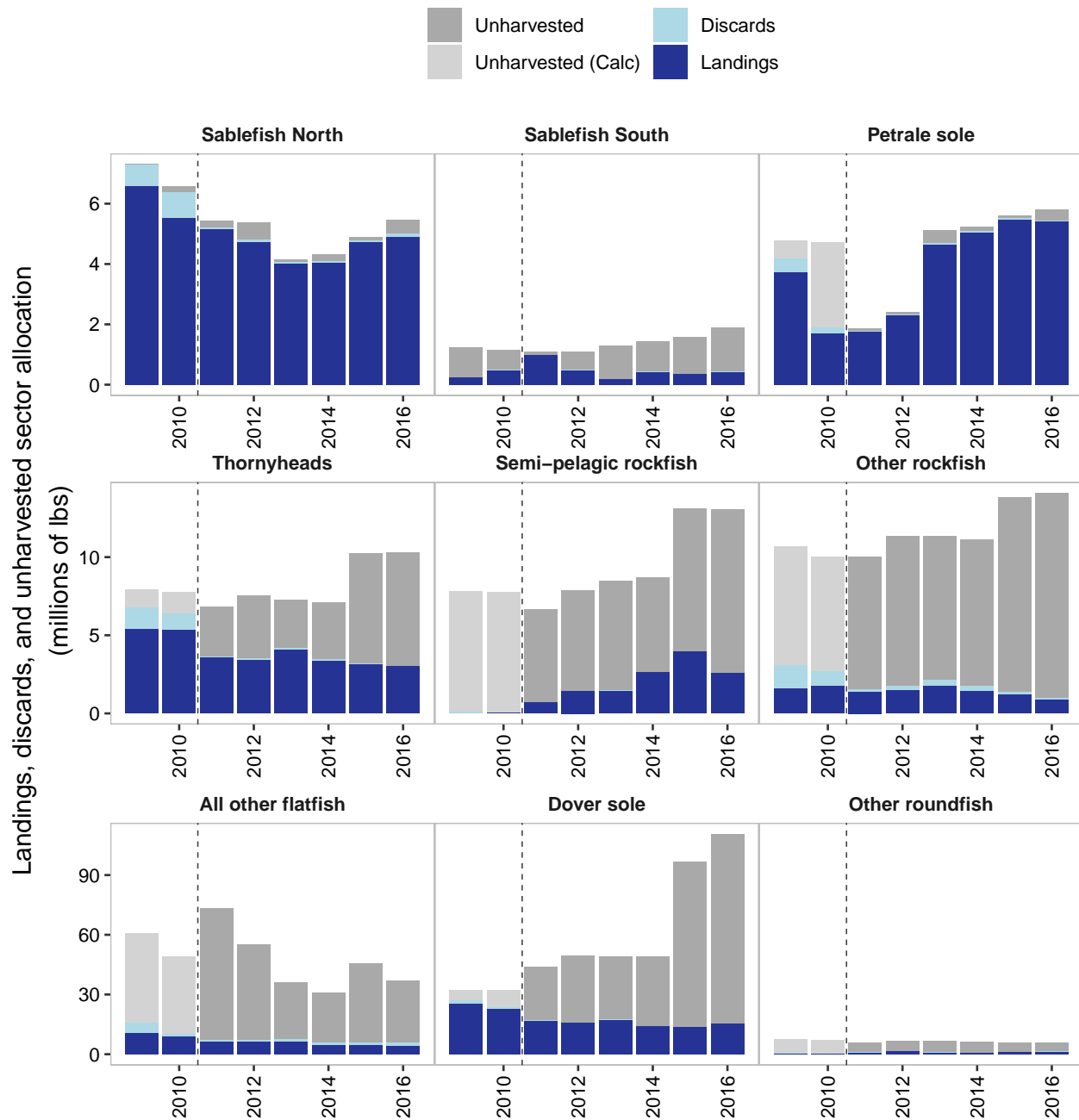


Figure 4: Landings (dark blue), Discards (light blue), and Unharvested (grey) trawl sector allocation of non-whiting groundfish species (millions of lbs). If carryover was made available for a specific quota category, the total weight was deducted from the original year and added to the following year. Except for sablefish, there was no trawl-specific quota in 2009 and 2010; for context, Unharvested (Calc) (light grey) was calculated for 2009 and 2010 as $\text{Optimal Yield} \times \frac{2011 \text{ Trawl Sector Allocation}}{2011 \text{ Annual Catch Limit}} - \text{Landings} - \text{Discards}$ by stock or complex.

Catcher Vessel Sector Description

In 2016, the sixth year of the catch share program, there were 97 catcher vessels that participated in the program. These include both catcher vessels that deliver shoreside and those that deliver to at-sea motherships.¹⁰ Catcher vessels generated \$78.7 million in income and 711 jobs from deliveries of fish caught in the catch share program.¹¹ These vessels caught about 61% of all catch share fish (the catcher-processor sector caught the remainder) and 40% of all fish caught commercially on the West Coast.

The catcher vessels that fished in 2016 ranged from 44 feet to 141 feet in length and employed between one and four crew members. The total fleet-wide number of days spent fishing in the limited entry groundfish trawl fishery has decreased from 9,130 during the pre-catch share period (2009-2010) to 6,250 in 2016. There were 65 vessels that fished in 2009 and/or 2010 that did not fish in 2016. Of those vessels, 28 stopped fishing on the West Coast completely and 37 continued fishing in other fisheries (e.g., shrimp, crab, tuna, and California halibut). Despite the exit of some vessels from the catch share program, there were 20 vessels that fished in 2016 but did not fish in the trawl fishery in 2009 or 2010. Of those “new” vessels, 14 fish in the Groundfish fixed gear with trawl endorsement fishery.

The two ports with the highest catch share landings in 2016 were Astoria and Newport, Oregon (Table 1). Astoria received 77.5 million pounds of catch share fish, worth \$17.2 million and Newport received 61 million pounds, worth \$11.3 million. All Washington ports combined, received 78.8 million pounds, worth \$6 million. All of the California ports combined received 8.9 million pounds, worth \$7.8 million. Seventeen vessels delivered 143 million pounds of fish to at-sea motherships, worth \$10.6 million. Compared to 2015, ex-vessel revenue in the at-sea whiting fishery and deliveries to Washington ports increased by 70% along with a 130% increase in total catch, a result of a return to more favorable Pacific whiting fishing conditions. Southern Oregon experienced a slight increase in total ex-vessel revenue in 2016 compared to 2015, but Northern California experienced a 14% decrease in ex-vessel revenue with a commensurate decrease in landings.

Table 1: Deliveries by port area. Total ex-vessel revenue, landings weight, and number of vessels delivering to each port area for all catch share fisheries in 2016. Some vessels make deliveries in multiple ports, and each vessel is counted in every port where catch is delivered. Delivery port areas by fishery are not shown to protect confidential information.

	Revenue (millions of \$)	Landings (millions of lbs)	Number of vessels
At-sea	10.6	142.6	17
Washington state	6.0	78.8	17
Astoria, Oregon	17.2	77.5	35
Newport, Oregon	11.3	61.0	24
Southern Oregon	4.7	6.2	19
Northern California	6.0	7.9	15
Morro Bay, Monterey, San Francisco, CA	1.8	1.0	9

¹⁰ Vessels can participate in both the shoreside and at-sea fisheries.

¹¹ Note that these impacts do not include the complementary impacts associated with the shorebased buyers and processors, nor the mothership vessels. Leonard, J., and P. Watson. 2011. Description of the input-output model for Pacific Coast fisheries. U.S. Dept. Commer., NOAA Tech. Memo. NMFS-NWFSC-111, 64 p.

Fishery Participation

For the purposes of this report, the catch share program is divided into the following six fisheries:

- At-sea Pacific whiting fishery
- Shoreside Pacific whiting fishery
- Non-whiting midwater trawl fishery¹²
- Dover sole, thornyheads, and sablefish (DTS) trawl with trawl endorsement fishery
- Non-whiting, non-DTS trawl with trawl endorsement fishery
- Groundfish fixed gear with trawl endorsement fishery

Most vessels participate in more than one of these fisheries. In addition to the catch share fisheries, most vessels also fish in Alaska or participate in state-managed fisheries (primarily shrimp and crab). A few vessels participate in other federally managed fisheries including the Groundfish fixed gear with fixed gear endorsement, salmon, and tuna fisheries. Participation in these other fisheries is more common for the shoreside non-whiting vessels, while fishing in Alaska is more common for the At-sea and Shoreside Pacific whiting vessels. The Groundfish fixed gear with trawl endorsement fishery is the result of a “gear switching” provision that allows either for vessels with trawl quota to fish with fixed gear (pots or longlines) or for vessels that traditionally fished with fixed gear to lease or purchase trawl quota and fish with fixed gear. Fixed gear is primarily used to target sablefish. The At-sea and Shoreside Pacific whiting fisheries are the highest volume fisheries.

The At-sea Pacific whiting season begins on May 15. The Shoreside Pacific whiting season begins on April 15 south of 40°30'N and on May 15 north of 40°30'N. Both the at-sea and shoreside whiting fisheries usually stop fishing around October though the fishery is open through the end of the year (Figure 5). The DTS trawl and Non-whiting non-DTS trawl fisheries occur year-round. Vessels that fish with both trawl permits and fixed gear permits tend to use the fixed gear permits during the Primary sablefish fishery (one component of the Groundfish fixed gear with fixed gear endorsement fishery) from April 1 through October 31, and then transfer a trawl permit onto their boat once they have finished fishing in that fishery. The opening of the crab season varies by state based on pre-season crab condition testing, but generally begins in December or January and lasts until March. Shrimp is caught between April and October. Salmon, halibut, and tuna are caught in much lower volumes throughout the year and are included as “Other fisheries” in the figure.

¹² In 2011, widow rockfish, one of the two main targets in the non-whiting midwater trawl fishery (the other is yellowtail rockfish), was taken off the overfished list. As a result, the annual catch limit for widow rockfish was increased in the 2013/2014 Biennial Harvest Specification. Vessels only began targeting widow in 2012.

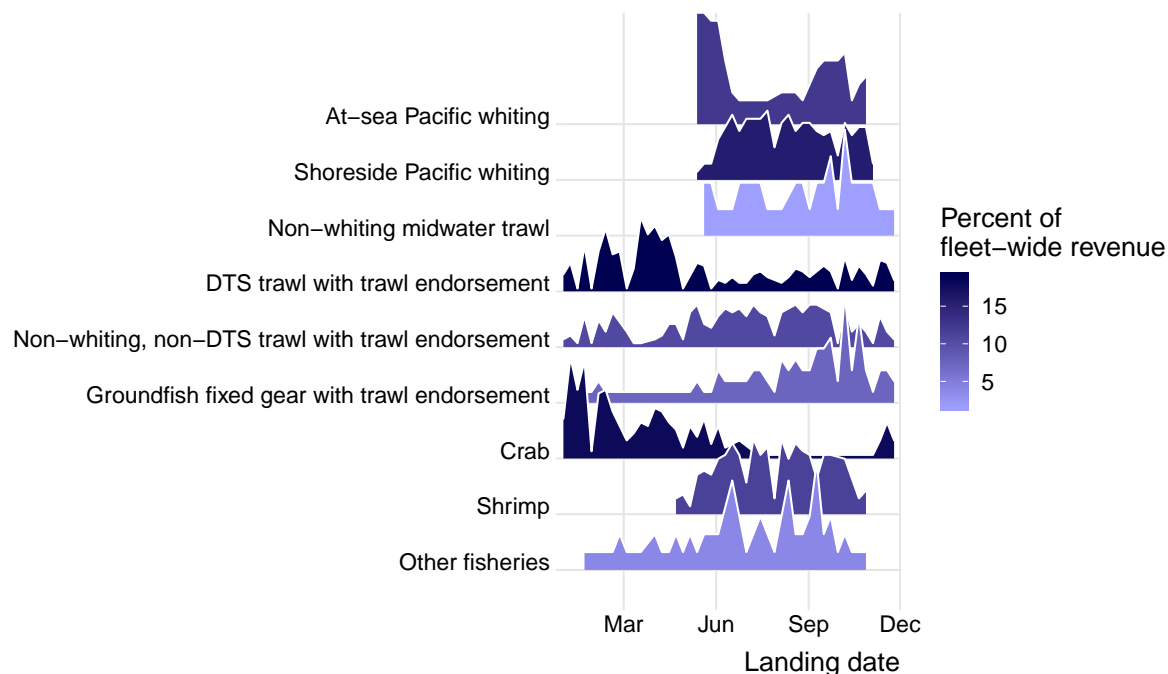


Figure 5: Proportion of trips by week within each fishery in 2016. Darker blue indicates a higher proportion of fleet-wide revenue and lighter blue indicates a lower proportion of revenue.

Economic Indicators

The EDC Program tracks economic indicators by compiling information submitted by participants about expenses and revenue and how those figures change over time. Pre-catch share data for the 2009 and 2010 operating years were submitted in 2011 and have been averaged to calculate “baseline” conditions within the fishery to which subsequent years of data can be compared. Values reported in the Overview are inflation-adjusted 2016 dollars.

The EDC Program measures the net economic benefits of the catch share program by reporting two types of net revenue. The first is variable cost net revenue, which is revenue minus variable costs. The second is total cost net revenue, which is revenue minus both variable and fixed costs.¹³ To provide a complete picture of the changes that have occurred, both net revenue figures are presented at two scales: Average net revenue (Figure 6) is the value generated by a typical vessel, while fleet-wide net revenue (Figure 7) represents the total value generated by the fishery. Both figures only include revenues and costs associated with the catch share program. It is important to note that the EDC forms only capture costs that are directly related to vessel fishing operations, and do not include other expenses such as vehicles or office expenses that may be related to the fishing business. Therefore, the net revenue reported here is an overestimate of the true net revenue.¹⁴

¹³ See Figure 9 for a description of which costs are considered variable costs and which costs are considered fixed costs.

¹⁴ See Section 13 of the Data Summaries for more information.

Average Net Revenue

Average and variable cost net revenue was higher for all years after the implementation of the catch share program than the baseline years. Average variable cost net revenue was \$128,000 during the pre-catch share period, and fleet-wide variable cost net revenue was \$17.1 million. In 2016, the average variable cost net revenue was \$250,000 and the fleet-wide was \$24.2 million.

Total cost net revenue was also higher in all years since the implementation of the catch share program. The trends are the same for average and fleet-wide total cost net revenue. Both were highest, in 2013 (\$160,000), and lowest in 2012 (\$66,100) for both. The second highest total cost net revenue occurred in 2016 (\$14.5 million).

Increases in revenue are a result of a combination of considerable increases in

TAC for Pacific whiting (compared to the baseline) as well as increases in ex-vessel prices for many target species. Compared to the pre-catch share period, the 2016 ex-vessel price for dover sole was 25% higher (\$0.45 per pound in 2016), and the ex-vessel price for thornyheads was 20% higher (\$0.68).

The average ex-vessel price for sablefish was a record high in 2011 (\$2.94), but decreased in 2012 to previous years' levels (\$2.14) (Figure 8). Despite a low of \$1.85 in 2013, sablefish prices steadily increased from 2014-2016, with a high of \$2.40 in 2016.

The ex-vessel price for Pacific whiting delivered shoreside was higher than pre-catch shares (\$0.09 per pound) levels in all years since the implementation of the catch share program, until recently when the price dropped to \$0.08 per pound in 2015 and again to \$0.07 in 2016 (Figure 3).

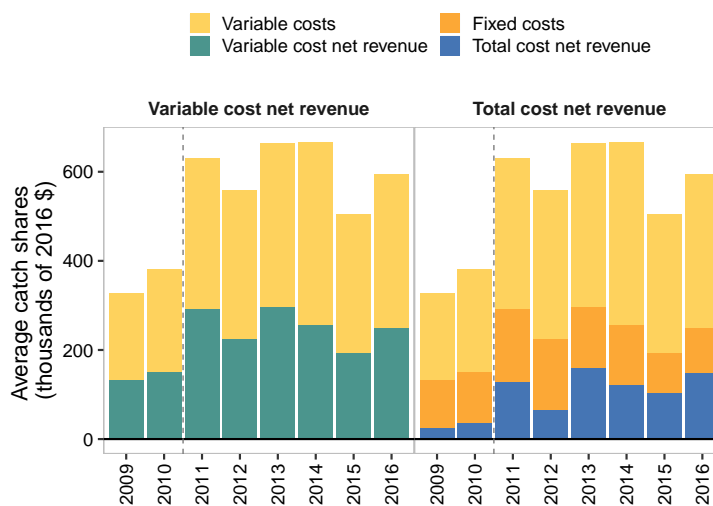


Figure 6: Average variable cost net revenue (ex-vessel revenue minus variable costs), and average total cost net revenue (ex-vessel revenue minus variable costs and fixed costs) per vessel from participation in all of the catch share fisheries combined (thousands of 2016 \$). Dashed line represents the beginning of the catch share program.

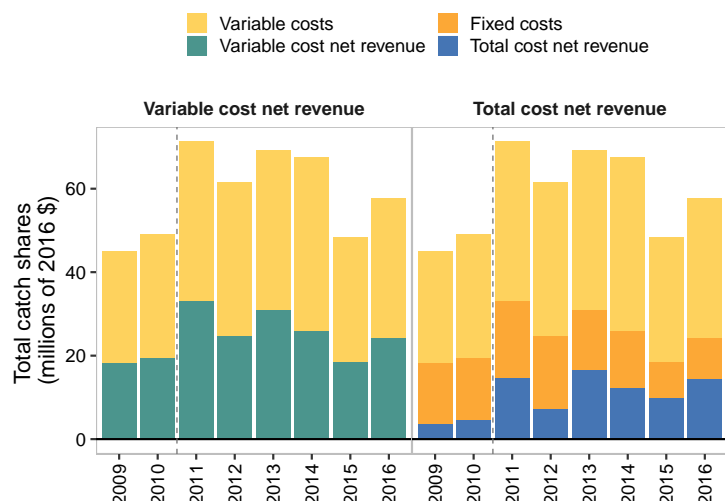


Figure 7: Fleet-wide variable cost net revenue (ex-vessel revenue minus variable costs), and fleet-wide total cost net revenue (ex-vessel revenue minus variable costs and fixed costs) from participation in all of the catch share fisheries combined (millions of 2016 \$).

here should be considered a lower bound of the actual net revenue (see Section 13.3 of Data Summaries).

For all catch share vessels, the variable cost net revenue when quota was included was between 2.1% and 20.7% less than the variable cost net revenue when it was not included. For whiting vessels, the difference in variable cost net revenue when including quota versus not including quota was largest in 2015 (10% less), and for groundfish vessels, the difference was highest in 2016 (33% less). Including quota lease earnings increased the average revenue for all catch share participation by fiscal year between 2.2% and 6.5% than the ex-vessel revenue alone over the time period 2011 to 2016.¹⁵

Mean costs

In all years (2009-2016), the highest variable cost categories were crew and captain compensation and fuel (Figure 9). The highest fixed costs were vessel and on-board equipment. Fleet-wide fixed costs were highest in 2011 and 2012, at \$18.4 million and \$17.5 million, but decreased to below pre-catch share levels in 2013 (\$14.3 million) and have steadily decreased to a low of \$9.77 million in 2016 as a result of a continued decreases in fleet size. In addition to the costs we have defined as variable and fixed, 79 vessels spent an average of \$75,300 on the purchase or lease of quota in 2016, an 16% increase over 2015 (\$65,000).

Crew and captain compensation both increased in 2016 (\$204,000) compared to 2015 (\$179,000) as a result of increased net revenue across the catch share program, mostly driven by a more successful Pacific whiting season.

Quota earnings and costs are excluded from most calculations of net revenue above and throughout this report because of data limitations. The data available do not allow for the allocation of costs to a specific fishery or calendar year (from the fiscal year reported on the EDC form); and quota lease revenue is not collected from quota accounts that are not directly linked to active vessels. Additionally, many quota trades are non-cash transactions and therefore cannot be included in the calculations. Despite these limitations, net revenue including quota was calculated to examine how these additional earnings and costs affect average operational performance measures currently reported. As a whole, quota earnings are likely underrepresented in the available data so net revenue presented

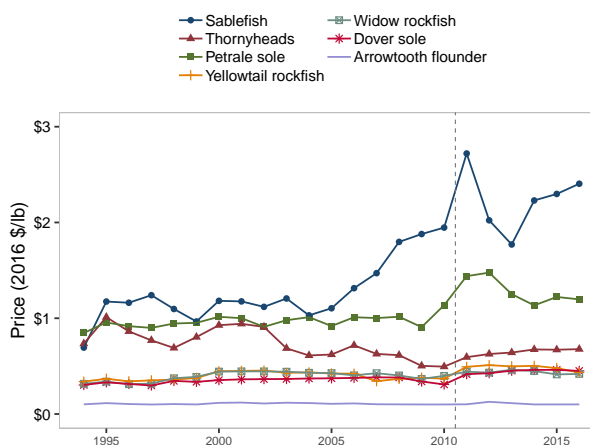


Figure 8: Ex-vessel prices (2016\$) for top species from 1994 to 2016.

¹⁵ Transactions from purchase or sale of quota shares are not included because there are too few observations.

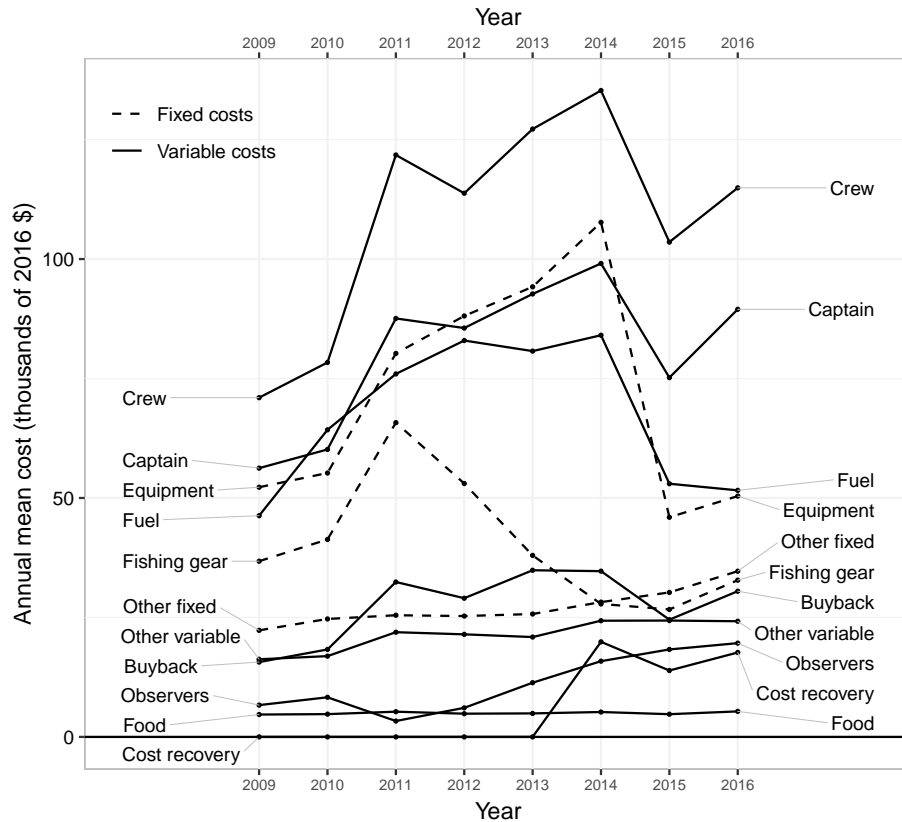


Figure 9: Average fixed (dashed line) and variable costs (solid line) (thousands of 2016 \$) per vessel in the West Coast Trawl Groundfish Catch Share Program. Note that vessels participating in Exempted Fishing Permit (EFP) programs during the pre-catch share period (2009-2010) paid for their own observer coverage.

Annual costs on fuel were highest in 2014 (\$84,100) and then decreased each year to \$51,600 in 2016. Cost recovery and buy back fees were higher in 2016 than 2015 because of higher ex-vessel revenue.

One significant change resulting from the implementation of the catch share program was a shift to 100% observer coverage with partial industry funding. Prior to catch shares, there was approximately 20% observer coverage, paid for by NMFS. In order to lessen the cost of transitioning to the required 100% observer coverage, catcher vessels received a maximum subsidy of \$328.50 per day in 2011 and 2012. This subsidy decreased in 2013 to \$256 per day and to \$216 per day in 2014. The subsidy in 2015 was \$108, but 2015 was also the first year where exempted fishing permits were issued to test Electronic Monitoring (EM) as an alternative. There were several alternative funding mechanisms used to subsidize the EM equipment and monitoring.

In 2016 catcher vessels spent an average of \$19,600 on observers and electronic monitoring while operating in the catch share program (Figure 9). In 2011, observer costs represented 1% of total variable costs, and increased to 6% in 2016. Note that as observer subsidies have decreased over time, the average expenses per vessel have increased and new costs associated with electronic monitoring have been introduced.

As noted above, most vessels participate in more than one fishery within the catch share program, as well as state and federally-managed fisheries that are not part of the catch share program. More details about each fishery and the economics of vessels participating in each fishery are included in the fishery-specific summaries in the following section.

Fishery Summaries

At-sea Pacific whiting

Seventeen vessels participated in the At-sea Pacific whiting fishery in 2016. These vessels delivered to six motherships as part of a single fishing cooperative. This fishery targets Pacific whiting (99.9% of total landings by weight) and has very low bycatch (Figure 10). Although the bycatch rate is extremely low, the total weight of bycatch was 1 million pounds in 2016. The majority of this catch consisted of semi-pelagic rockfish, coastal pelagics, and sharks, skates and rays. Unique to 2016, catcher vessels caught 130 thousand pounds of King-of-the-salmon. Not all species caught in this fishery must be “covered” with quota, but of the quota species, the most common were widow rockfish (164,000 pounds), yellowtail rockfish (112,000 pounds), sablefish (21,230 pounds), and roughey rockfish (15,910 pounds).

Total Revenue

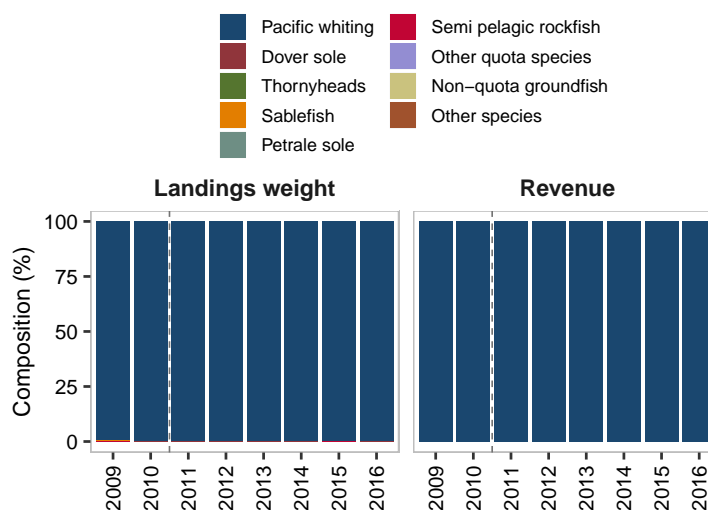


Figure 10: The species composition of catch (left) and revenue (right) in the At-sea Pacific whiting fishery (%). Dashed line represents the beginning of the catch share program.

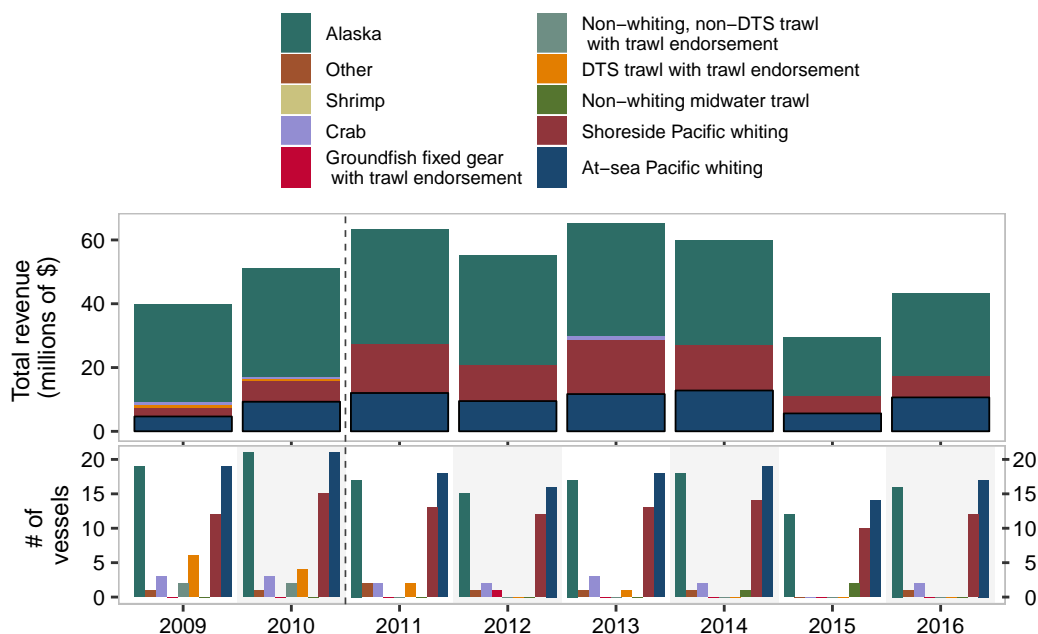


Figure 11: Total ex-vessel revenue earned by vessels that participated in the At-sea Pacific whiting fishery (black outline) by fishery (millions of 2016 \$) (top) and number of vessels that participated in each fishery (bottom). Dashed line represents the beginning of the catch share program. *Some values are suppressed to protect confidential data.

Participation in the At-sea Pacific whiting fishery resulted in \$10.6 million in ex-vessel revenue in 2016 (Figure 11 (top)). Vessels that participated in the At-sea Pacific whiting fishery also earned revenue fishing in Alaska (59% of total revenue) and fishing in the Shoreside Pacific whiting fishery (15.2% of total revenue). In 2016, most of the participants in the At-sea Pacific whiting fishery also fished in Alaska and 70% also fished in the Shoreside Pacific whiting fishery (Figure 11 (bottom)). In 2009 through 2011, there were some vessels that also fished in the bottom trawl fisheries (DTS trawl with trawl endorsement and Non-whiting, non-DTS trawl with trawl endorsement fisheries), but there has been nearly no participation in these fisheries by At-sea Pacific whiting vessels since 2012. With the exception of 2015, total revenue has been higher since the implementation of the catch share program, mainly due to a higher catch limit for Pacific whiting and Alaska pollock (for those vessels that fish in Alaska). In 2015 and 2016, total revenue from all activities for the at-sea whiting fleet was less than pre-catch shares levels, a result of a decrease in Alaska and West Coast earnings.

Average Net Revenue

Average revenue from participating in the At-sea Pacific whiting fishery was \$626,000. Average variable cost net revenue was \$246,000, and average total cost net revenue was \$117,000 in 2016 both the highest average net revenues recorded since the implementation of the EDC Program (Figure 12). Variable cost net revenue increased 45% as a result of increased catch. The revenue and net revenue figures correlate closely to the volume of Pacific whiting allocated to the mothership sector, except for 2015 which catch attainment was very low.

Mean costs

The largest mean costs in 2016 were for crew (\$111,000), followed by fuel (\$103,000), and captain compensation (\$81,300) (Figure 13). There were increases in nearly all cost categories between 2015 and 2016 as a result of increased fishing activities. On a per unit basis (not shown in the figure), fuel costs were the lowest to date (\$0.013), a 82% decrease compared to a high of \$0.024 per 100 pounds in 2012.

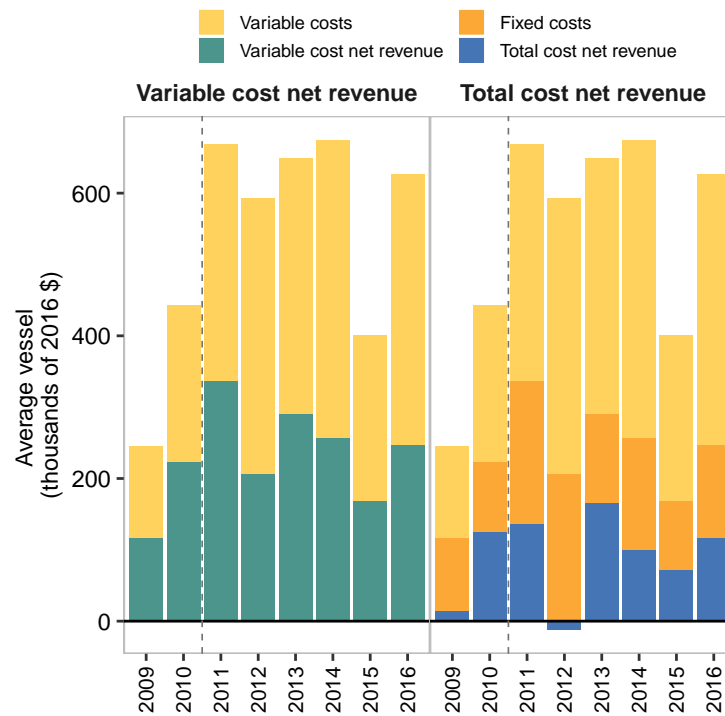


Figure 12: Average variable cost net revenue (ex-vessel revenue minus variable costs) (left), and average total cost net revenue (ex-vessel revenue minus variable costs and fixed costs) (right) from participation in the At-sea Pacific whiting fishery (thousands of 2016 \$). Dashed line represents the beginning of the catch share program.

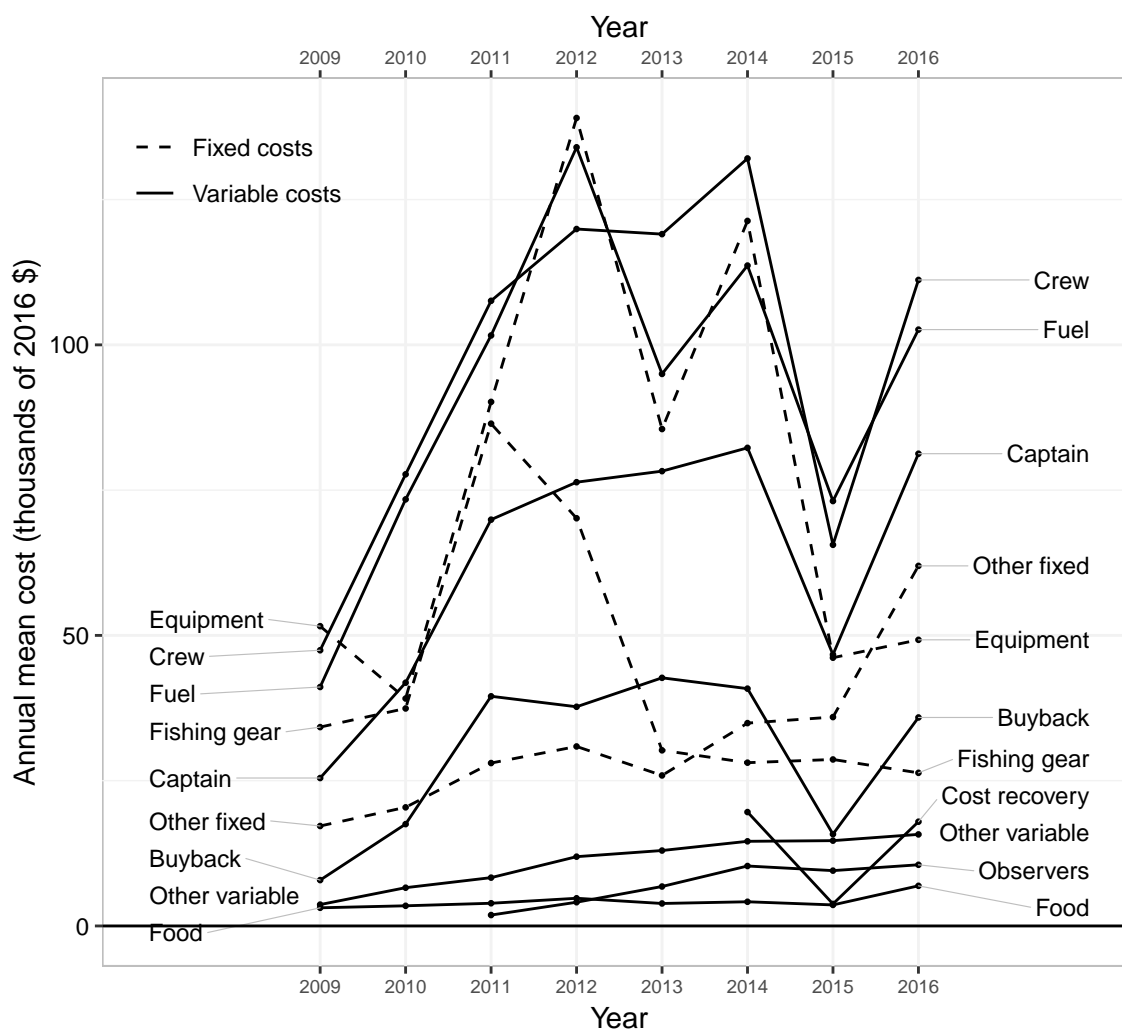


Figure 13: Average fixed (dashed line) and variable costs (solid line) per vessel in the At-sea Pacific whiting fishery (thousands of 2016 \$).

Shoreside Pacific whiting

Twenty-three vessels participated in the Shoreside Pacific whiting fishery in 2016. This fishery targets mainly Pacific whiting (98.5% of total landings by weight, Figure 14). In 2016, the bycatch rate in the Shoreside Pacific whiting fishery (1.5%) was double that of the At-sea fishery, amounting to 2.92 million pounds. The majority of the bycatch consisted of rockfish, sardines, sharks, skates and rays, and shad. Not all species caught in this fishery must be “covered” with quota, but of the quota species, the most common were yellowtail rockfish (828,000 pounds), widow rockfish (494,000 pounds), and rougheye rockfish (34,200 pounds).

Total Revenue

Participation in the Shoreside Pacific whiting fishery resulted in \$13.6 million in total ex-vessel revenue in 2016 (Figure 15 (top)). Vessels that participated in the Shoreside Pacific whiting fishery

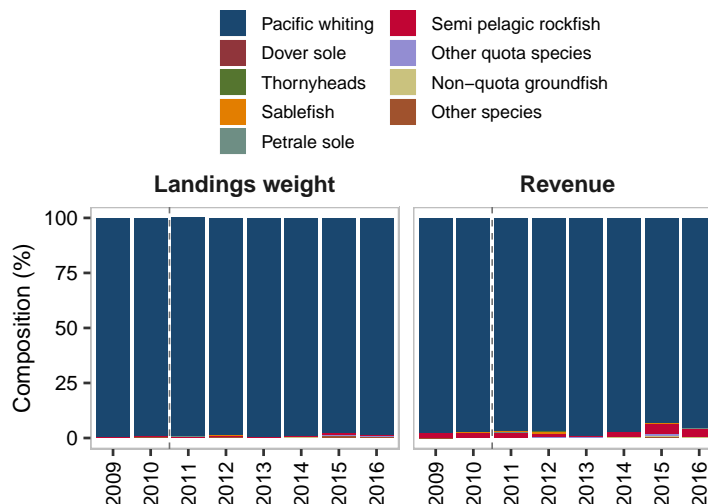


Figure 14: The species composition of catch (left) and revenue (right) in the Shoreside Pacific whiting fishery (%). Dashed line represents the beginning of the catch share program.

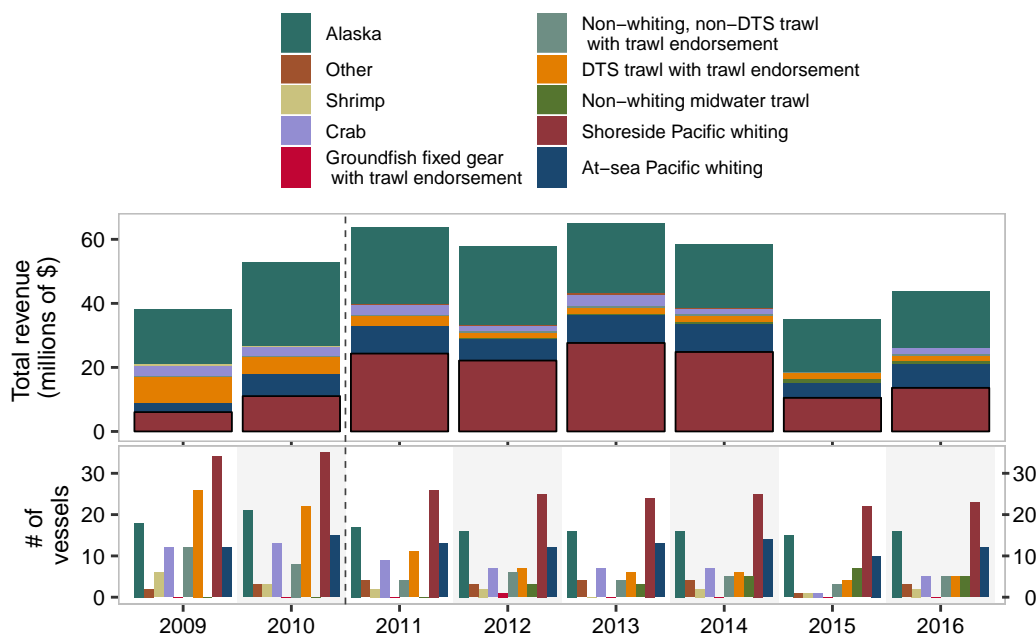


Figure 15: Total ex-vessel revenue earned by vessels that participated in the Shoreside Pacific whiting fishery (black outline) by fishery (millions of 2016 \$) (top) and number of vessels that participated in each fishery (bottom). Dashed line represents the beginning of the catch share program. *Some values are suppressed to protect confidential data.

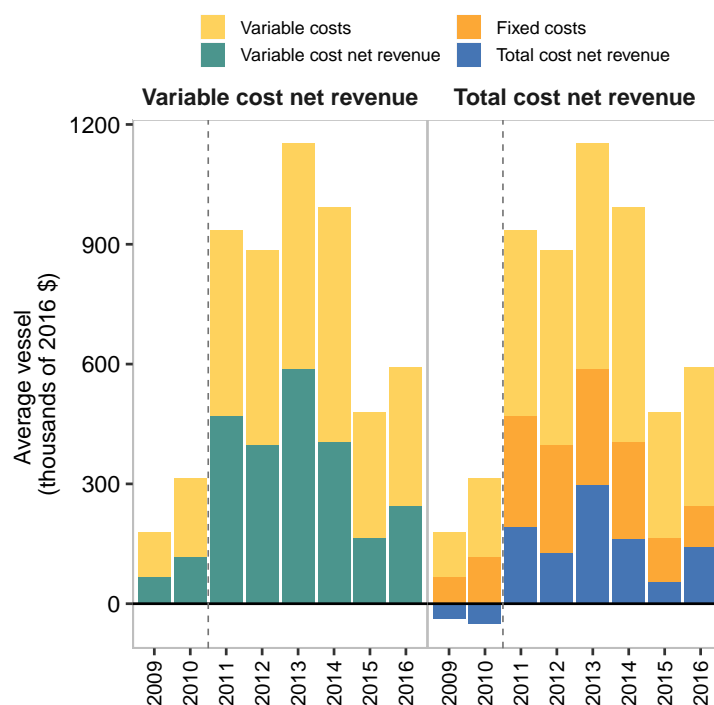


Figure 16: Average variable cost net revenue (ex-vessel revenue minus variable costs) (left), and average total cost net revenue (ex-vessel revenue minus variable costs and fixed costs) (right) from participation in the Shoreside Pacific whiting fishery (thousands of 2016 \$). Dashed line represents the beginning of the catch share program.

also earned revenue from fishing in Alaska (39.5% of total revenue) and fishing in the At-sea Pacific whiting fishery (17.1% of total revenue). The total revenue from all activities earned by Shoreside Pacific whiting vessels in 2015 and 2016 were lower than any year since the catch share program was implemented. This was a result of decreases in total ex-vessel revenue on the West Coast and in Alaska, and a decrease in the total number of vessels fishing in the fishery. The number of Shoreside Pacific whiting vessels decreased from an average of 25 vessels since the catch share program was implemented (2011-2014) to 22 in 2015 and 23 in 2016.

Average Net Revenue

Average revenue from participating in the Shoreside Pacific whiting fishery was \$593,000, average variable cost net revenue was \$245,000, and average total cost net revenue was \$144,000 in 2016 (Figure 16). Increases in ex-vessel revenue during the first four years of the catch share program were a result of an increase in the catch limit for Pacific whiting, especially in 2011, and steadily increasing ex-vessel prices paid by first receivers to the shoreside fleet. Variable cost net revenue was lowest in 2015. The variable cost net revenue in 2016 was slightly higher a result of better fishing conditions but not as high as previous catch share years as a result of lower ex-vessel prices. Ex-vessel revenue, variable cost net revenue, and total cost net revenue were all highest in 2013 from a combination of a high catch limit and relatively low fuel costs.

Mean costs

The largest mean costs in 2016 were for crew (\$111,000), followed by captain (\$80,400), and fuel (\$71,100) (Figure 17). Mean expenses on vessel and on-board equipment allocated to the Shoreside Pacific whiting fishery was higher than pre-catch share levels from 2011-2015, but decreased to pre-catch share levels (\$30,300) in 2016.

This trend is primarily a result of changes in total ex-vessel revenue from Shoreside Pacific whiting as a share of total earnings. Crew and compensation dropped 54% between 2014 and 2015, as a result of the decrease in ex-vessel revenue and net revenue. On a per unit basis (not shown in the figure), crew compensation decreased from \$1.40 per hundred pounds delivered relative to the pre-catch share period to \$1.35 per hundred pounds in 2016, and captain compensation increased from \$0.93 per hundred pounds delivered in 2009 to \$0.97 per hundred pounds in 2016. Fuel costs were the lowest to date (\$0.89), a 255% decrease compared to a high of \$2.1 per 100 pounds in 2010.

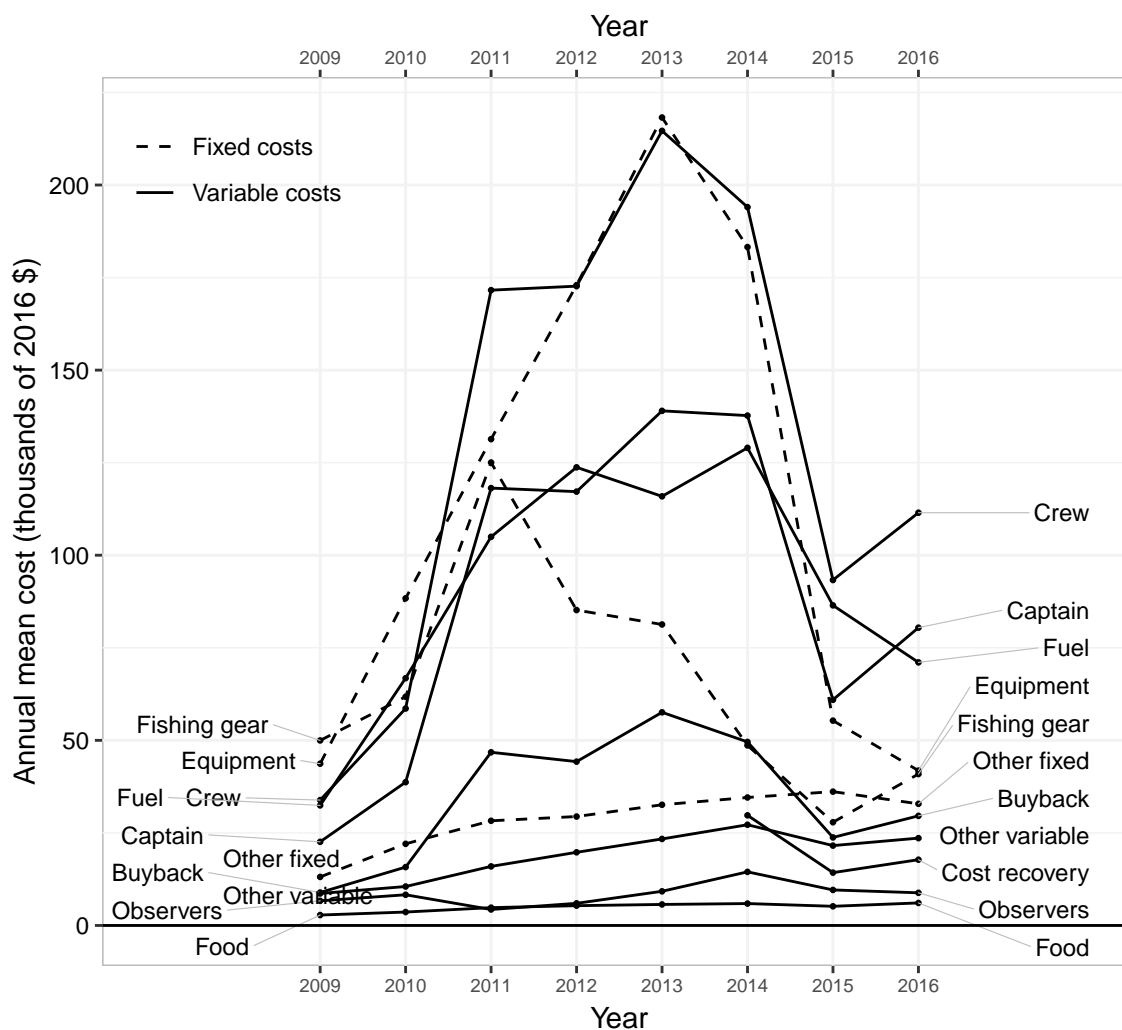


Figure 17: Average fixed (dashed line) and variable costs (solid line) per vessel in the Shoreside Pacific whiting fishery (thousands of 2016 \$).

Non-whiting midwater trawl

Vessels only began participating in the Non-whiting midwater trawl fishery in 2012, as a result of increased quota for widow rockfish. In 2016, nine vessels participated. This fishery targets mainly yellowtail rockfish (35% of catch in 2016) and widow rockfish (32%) using midwater trawl gear. This is the same gear used to target Pacific whiting. Yellowtail rockfish constituted the largest revenue source (51% of revenue in 2016), followed by widow rockfish (43%) (Figure 18). There were two fewer vessels that fished in 2016 compared to 2015, potentially as a result of a stronger whiting season, resulting in fewer vessels looking for alternate fishing opportunities.

This reemerging fishery was further facilitated by the approval of an Exempted

Fishing Permit that exempted vessels from certain restrictions to allow them to fish for midwater rockfish year-round in all areas.

Total Revenue

The ex-vessel revenue from participating in the Non-whiting midwater trawl fishery makes up a small share (12.3%) of total revenue for those vessels. The share decreased between 2015 and 2016 as the total earnings in the Non-whiting midwater trawl fishery decreased and the earnings from the Shoreside Pacific whiting fishery increased. Vessels that participated in the Non-whiting midwater trawl fishery also earned revenue from the Shoreside Pacific whiting fishery (25% of revenue) as well as both bottom trawl fisheries (31.6%) (Figure 19). In 2016, there were three Non-whiting midwater trawl vessels that also fished in Alaska.

Average Net Revenue

Average revenue from participating in the Non-whiting midwater trawl fishery was \$148,000, average variable cost net revenue was \$69,200, and average total cost net revenue was \$46,500 in 2016 (Figure 20). Net revenue (both variable cost and total cost) was lowest in 2014 and then increased in both 2014 and 2015.

Mean costs

The largest mean costs in 2016 were for crew (\$30,400), followed by captain (\$22,700), and vessel and on-board equipment (\$11,200) (Figure 21). Crew and captain payments were higher in 2016 than any previous year.

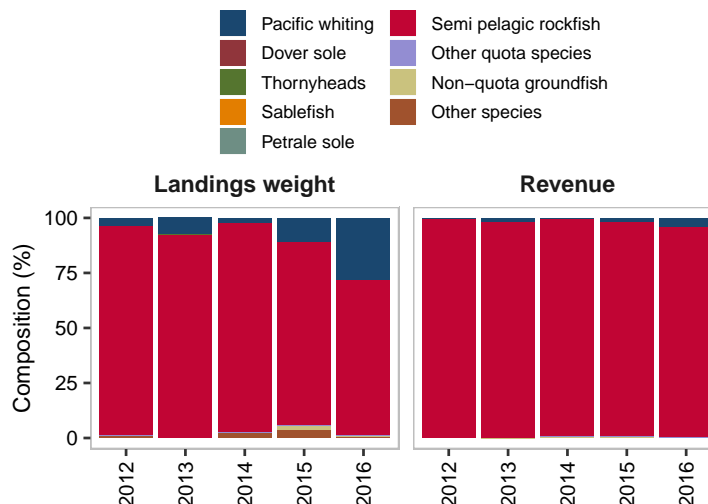


Figure 18: The species composition of catch (left) and revenue (right) in the Non-whiting midwater trawl (%). Vessels did not begin participating in this fishery until 2012.

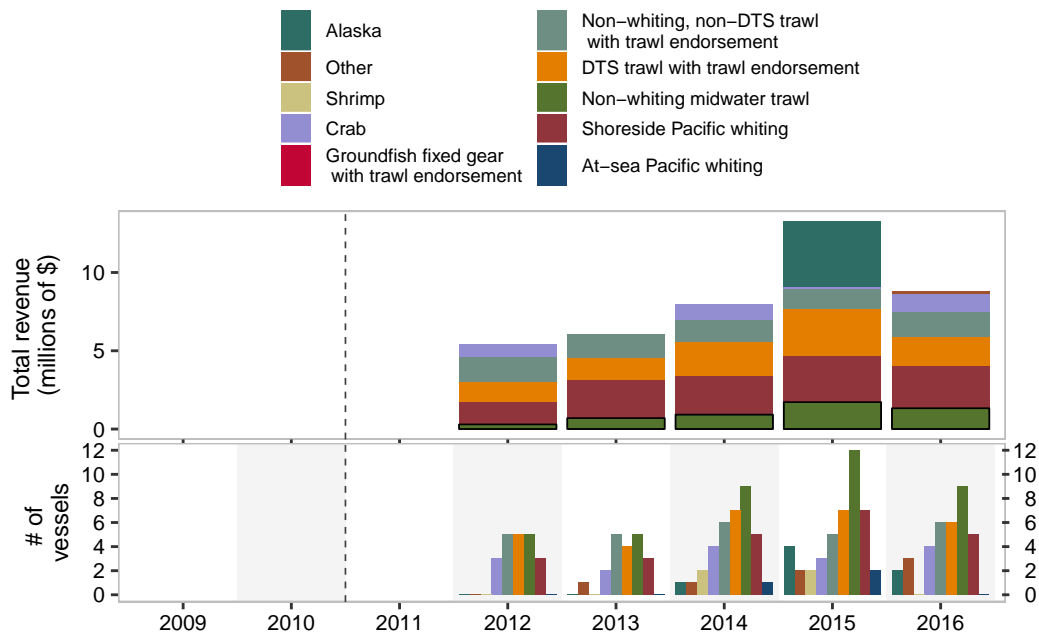


Figure 19: Total ex-vessel revenue earned by vessels that participated in the non-whiting midwater trawl fishery (black outline) by fishery (millions of 2016 \$) (top) and number of vessels that participated in each fishery (bottom). Vessels did not begin participating in this fishery until 2012. *Some values are suppressed to protect confidential data.

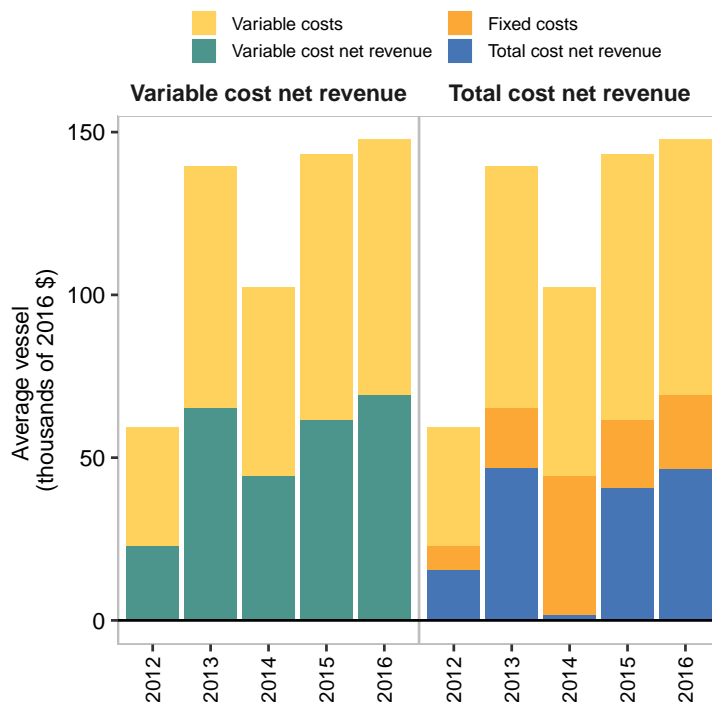


Figure 20: Average variable cost net revenue (ex-vessel revenue minus variable costs) (left), and average total cost net revenue (ex-vessel revenue minus variable costs and fixed costs) (right) from participation in the Non-whiting midwater trawl (thousands of 2016 \$). Vessels did not begin participating in this fishery until 2012.

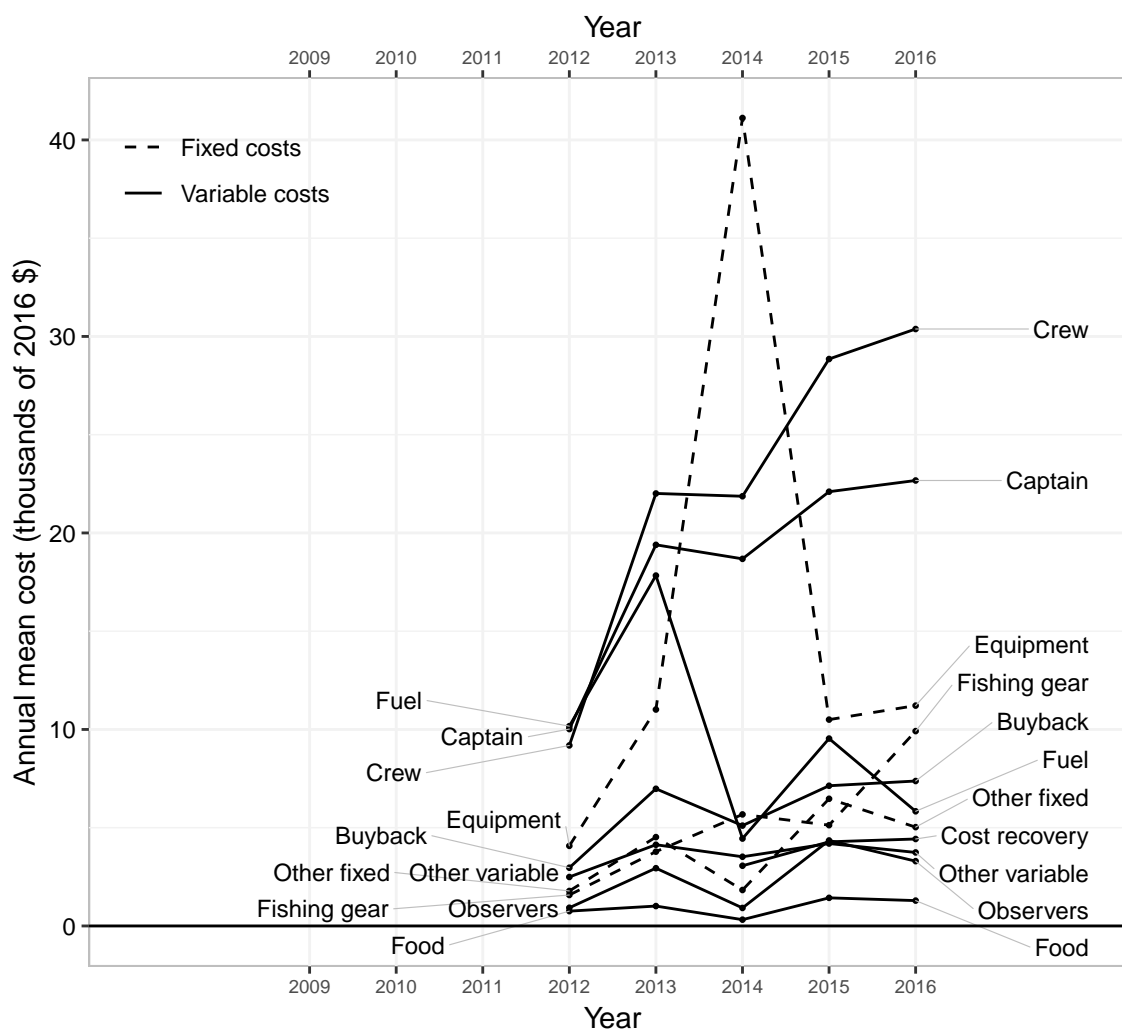


Figure 21: Average fixed (dashed line) and variable costs (solid line) per vessel in the Non-whiting midwater trawl fishery (thousands of 2016 \$).

DTS trawl with trawl endorsement

Fifty vessels participated in the DTS trawl with trawl endorsement fishery in 2016. The largest number of vessels exited the fishery between 2013 and 2014 (7 vessels). The number of active vessels dropped below half of the pre-catch share levels in 2011, but the number remained constant between 2014 and 2015 and only dropped by one vessel in 2016. This fishery targets mainly dover sole (52.9% of catch in 2016), thornyheads (11%), and sablefish (11%) using trawl gear. Whether dover sole or sablefish makes up a higher proportion of earnings depends on the year. Dover sole made up a higher share of earnings from 2012 through 2014. Since 2014, sablefish and dover sole each made up approximately one-third of ex-vessel revenue in the DTS trawl with trawl endorsement fishery (Figure 22). The fishery catches

smaller amounts of other quota species (including rockfish, 12.1% of catch), and marginal amounts of other non-quota groundfish and other species. The relative share of dover sole landings has stayed consistent through time, ranging from 47% to 53% of catch by weight. The relative share by ex-vessel revenue has varied more, ranging from 29% to 39%. Sablefish only makes up between 8 and 13% of total landings weight, but between 25 and 46% of ex-vessel revenue.

Total Revenue

In 2016, vessels that participated in the DTS trawl with trawl endorsement fishery earned revenue from crab, shrimp, and the Non-whiting non-DTS trawl, and to a much smaller extent, the Shoreside Pacific whiting and non-whiting midwater fisheries (Figure 23). In 2016, participation in the shrimp fishery made up 20% of total revenue, a decrease from 2015 when the crab season did not open in most areas because of consumer safety concerns related to domoic acid. Of the vessels that participated in the DTS trawl with trawl endorsement fishery, 26 vessels also participated in the crab fishery in and 23 vessels in the shrimp fishery. Although some vessels fished in Alaska in 2009-2011 (10-11 vessels), fewer than four vessels have fished in Alaska since 2011 and there were none in several years. The total revenue for all activities for DTS trawl with trawl endorsement vessels was highest in 2009 (\$65.1 million) and lowest in 2016 (\$44.9 million) (Figure 23). In 2016, the total earnings from fishing in the DTS trawl and Non-whiting non-DTS trawl fisheries was slightly higher than 2015, (\$16.5 million compared to \$16.6 million), but shrimp earnings decreased by 56%. This decrease (\$11.5 million) was not completely offset by the return of the crab fishery in 2016 (\$6.92 million).

Average Net Revenue

Average revenue from participating in the DTS trawl with trawl endorsement fishery was \$329,000, average variable cost net revenue was \$137,000, and average total cost net revenue was \$82,500 in 2016 (Figure 24). Average revenue has been higher than pre-catch share levels in all years. The highest revenue occurred in 2011, the lowest

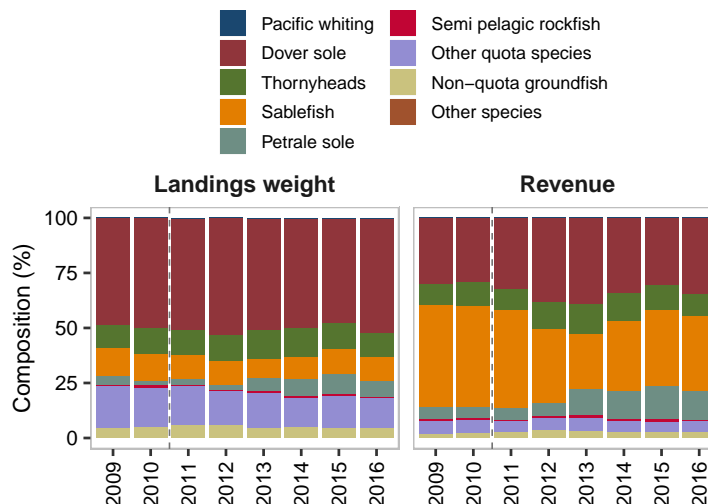


Figure 22: The species composition of catch (left) and revenue (right) in the DTS trawl with trawl endorsement fishery (%). Dashed line represents the beginning of the catch share program.

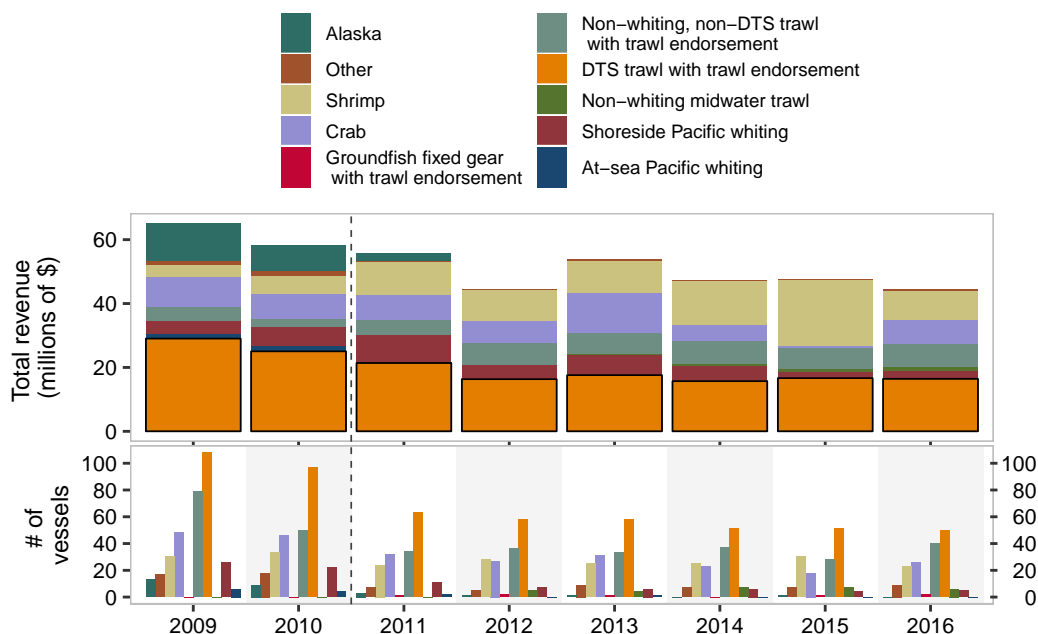


Figure 23: Total ex-vessel revenue earned by vessels that participated in the DTS trawl with trawl endorsement fishery (black outline) by fishery (millions of 2016 \$) (top) and number of vessels that participated in each fishery (bottom). Dashed line represents the beginning of the catch share program. *Some values are suppressed to protect confidential data.

in 2012, and has steadily increased every year since. Average variable cost net revenue has also been higher than the pre-catch share period (\$104,000) in every year since the catch share program was implemented. Average total cost net revenue has been higher than the pre-catch share period, with the exception of 2012 when it was \$105,000.

Mean costs

The largest mean costs in 2016 were for crew (\$66,900), followed by captain (\$55,300), and vessel and on-board equipment (\$31,900) (Figure 25). For most cost categories, the cost per pound in the DTS trawl with trawl endorsement fishery has remained stable since the implementation of the catch share program. Two exceptions are observer costs and fuel costs. The cost per pound of observer coverage steadily increased from 2011 through 2015 as the subsidy was decreased, but the cost per pound did not change between 2015 and 2016 (\$0.04). There has been a significant drop in fuel costs since the implementation of the catch share program, dropping from \$0.12 per pound in 2011 to \$0.04 in 2016. The mean average cost for fuel also dropped from an average of \$35,000 per year from 2009-2014 to an average of \$15,900 in 2015-2016.

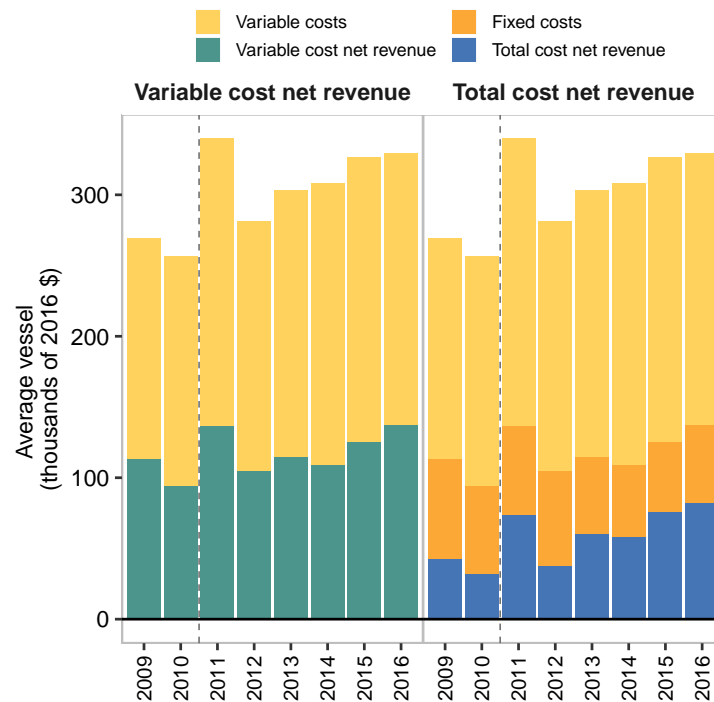


Figure 24: Average variable cost net revenue (ex-vessel revenue minus variable costs) (left), and average total cost net revenue (ex-vessel revenue minus variable costs and fixed costs) (right) from participation in the DTS trawl with trawl endorsement fishery (thousands of 2016 \$). Dashed line represents the beginning of the catch share program.

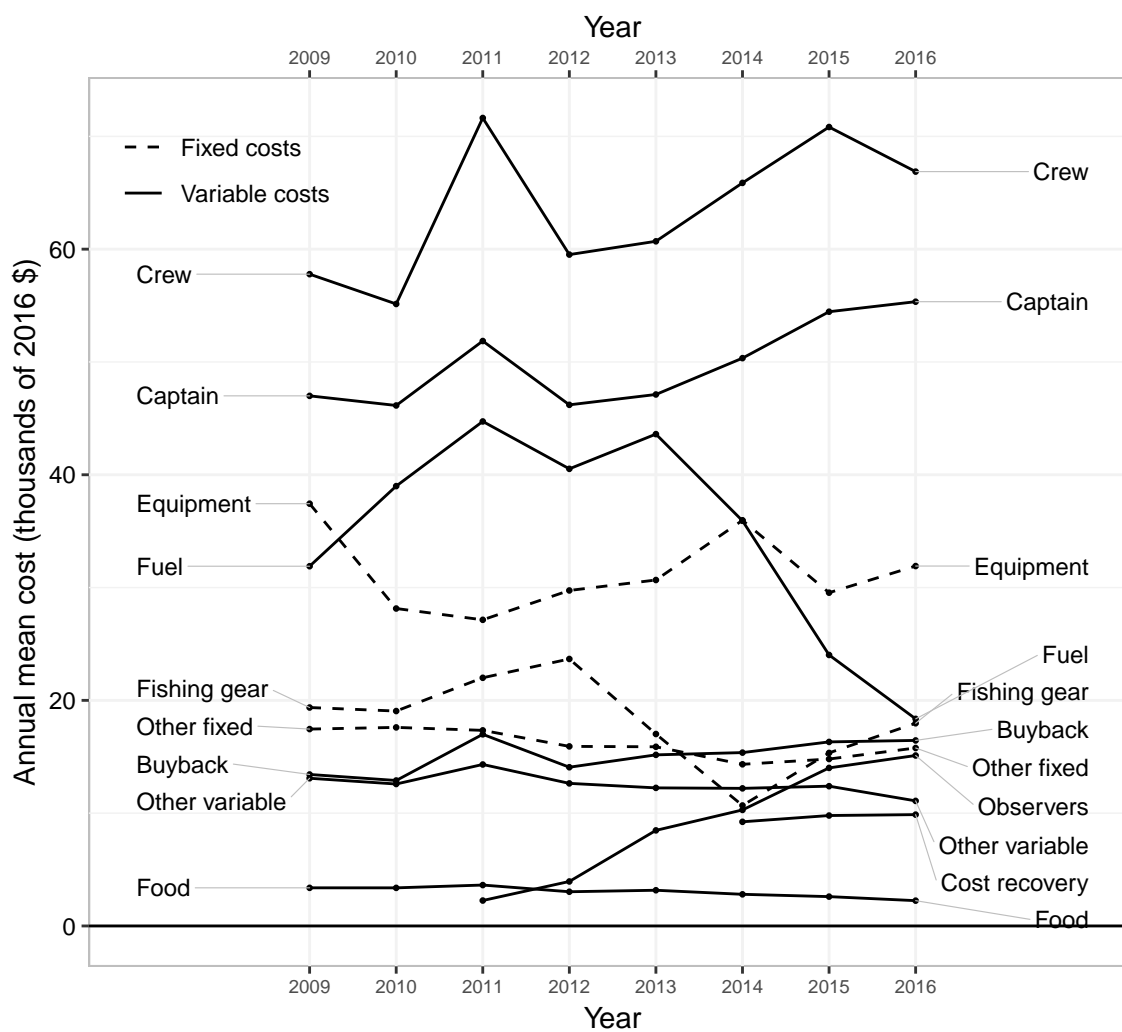


Figure 25: Average fixed (dashed line) and variable costs (solid line) per vessel in the DTS trawl with trawl endorsement fishery (thousands of 2016 \$).

Non-whiting, non-DTS trawl with trawl endorsement

Forty-seven vessels participated in the Non-whiting, non-DTS trawl with trawl endorsement fishery in 2016. Overall, this fishery has a lower value (Figure 5) than the other catch share fisheries. Vessels in this fishery target mostly petrale sole (28.9%), other quota species (27.9%), and dover sole (22.2%). The most common “other quota species” are Pacific cod, arrowtooth flounder, and rex sole. Non-quota groundfish are also caught in relatively large proportions (Figure 26).

Total Revenue

Participation in the Non-whiting, non-DTS trawl with trawl endorsement fishery makes up about 20% of total revenue for participants in that fishery (Figure 27) in most years. However in 2015, as a result of the closure of the crab fishery and very little participation in the Shoreside Pacific whiting fishery, vessels earned 31% of their total revenue from the Non-whiting, non-DTS trawl with trawl endorsement fishery. The share of total earnings returned to 24% in 2016. These vessels also participate in the DTS trawl with trawl endorsement, shrimp, and crab fisheries. A few vessels fished in Alaska in the early years of the program, but since 2013, none of the Non-whiting, non-DTS trawl vessels have fished in Alaska (Figure 27). In 2016, 65% of total revenue came from participation in the shrimp, crab, and DTS trawl with trawl endorsement fisheries.

Average Net Revenue

The average revenue, variable cost net revenue, and total cost net revenue from participating in the Non-whiting, non-DTS trawl with trawl endorsement fishery have all steadily increased since the implementation of the catch share program. Average revenue was \$194,000, variable cost net revenue was \$81,600, and total cost net revenue was \$50,500 in 2016 (Figure 28). All three were highest in 2015, likely because many vessels entered the Non-whiting, non-DTS trawl with trawl endorsement fishery as a result of poor fishing conditions in the Pacific whiting and Crab fisheries. Both net revenue measures were greater in the catch shares years, variable cost net revenue increased 5 fold between the pre-catch share period and 2016, and total cost net revenue was less than zero during the pre-catch share period.

Mean costs

The largest mean costs in 2016 were for crew (\$35,800), followed by captain (\$30,300), and vessel and on-board equipment (\$17,400) (Figure 29). Costs on crew compensation and captain compensation per pound increased by 21% and 23%, respectively, in 2016 compared to the pre-catch share period. In contrast, the cost per pound for fuel decreased 62% between the pre-catch share period and 2016.

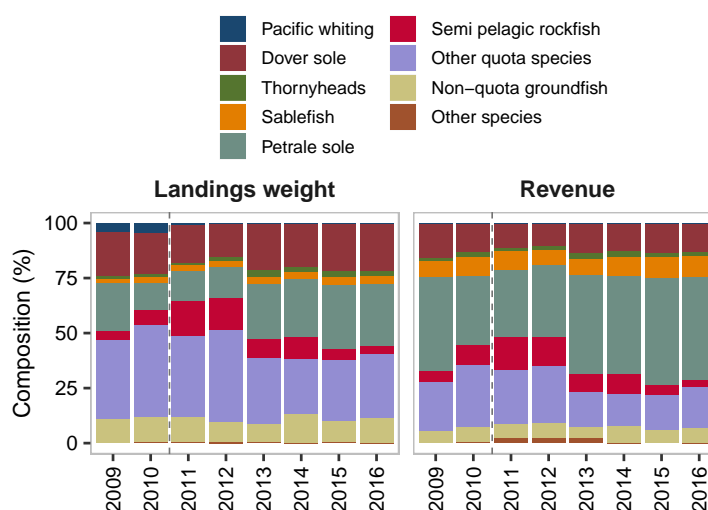


Figure 26: The species composition of catch (left) and revenue (right) in the Non-whiting, non-DTS trawl with trawl endorsement fishery (%). Dashed line represents the beginning of the catch share program.

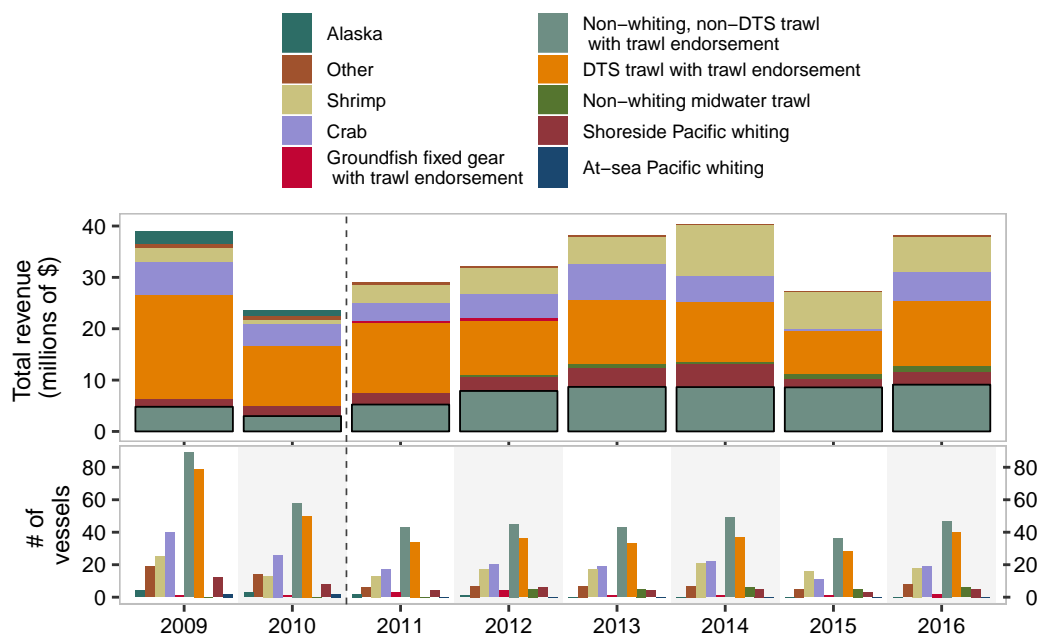


Figure 27: Total ex-vessel revenue earned by vessels that participated in the Non-whiting, non-DTS trawl with trawl endorsement fishery (black outline) by fishery (top) and number of vessels that participated in each fishery (bottom). Dashed line represents the beginning of the catch share program. *Some values are suppressed to protect confidential data.

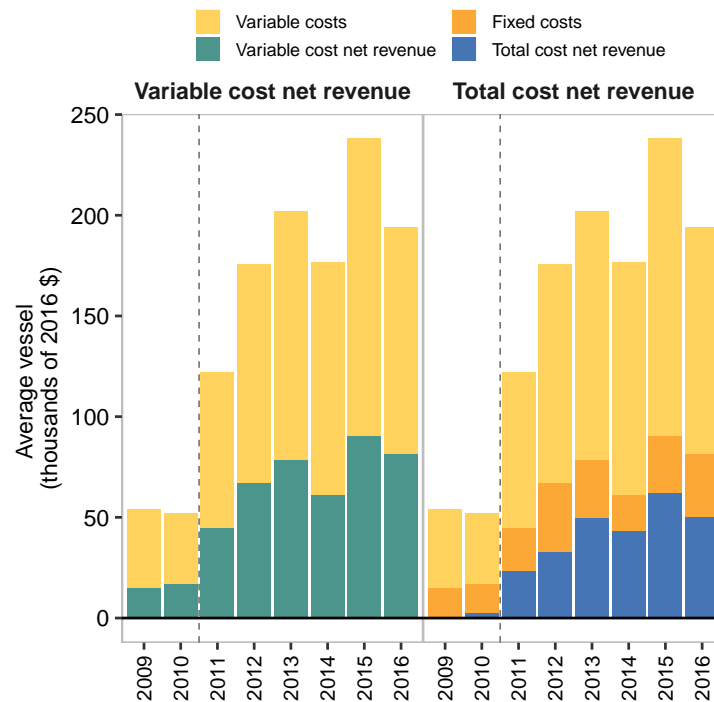


Figure 28: Average variable cost net revenue (ex-vessel revenue minus variable costs) (left), and average total cost net revenue (ex-vessel revenue minus variable costs and fixed costs) (right) from participation in the Non-whiting, non-DTS trawl with trawl endorsement fishery (thousands of 2016 \$). Dashed line represents the beginning of the catch share program.

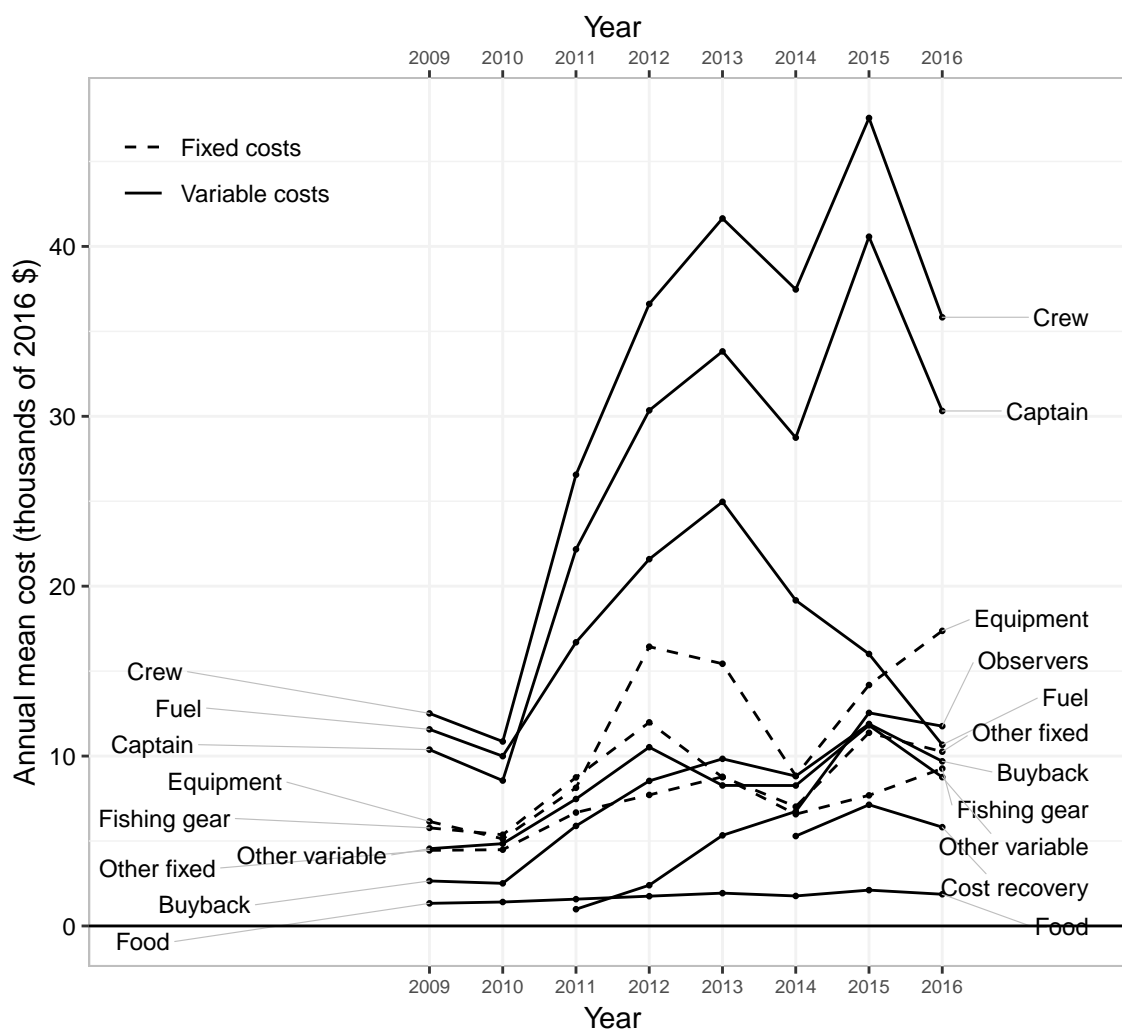


Figure 29: Average fixed (dashed line) and variable costs (solid line) per vessel in the Non-whiting, non-DTS trawl with trawl endorsement fishery (thousands of 2016 \$).

Groundfish fixed gear with trawl endorsement

In the first two years of the catch share program, 26 vessels fished with sablefish trawl quota using fixed gear. Since then, the number of vessels has ranged from 18 and 19 since 2013. This fishery targets almost exclusively sablefish (96% of catch in 2016) (Figure 30). In 2009 and 2010, there was a small number of vessels that fished in an Exempted Fishing permit fishery, fishing with fixed gear with limited entry trawl permits. This program was sponsored by the Nature Conservancy.¹⁶

As described in the Fishery Participation section (page 14), unlike the other fisheries, this fishery uses fixed gear (either fish pots or longlines). Generally, the vessels fishing with fish pots are vessels that have historically fished with trawl gear and have switched to using fish pots to harvest groundfish, almost entirely sablefish. The vessels fishing with longline gear participate primarily in the limited entry fixed gear sablefish fishery and have acquired a limited entry trawl permit and quota in order to target sablefish allocated to the trawl fishery. The number of vessels fishing with pots dropped from 20 to a low of 10, but steadily increased from 2014 and 2016 to 14. The number of vessels fishing with longlines has decreased 46% to seven vessels, two vessels used both types of fixed gear.

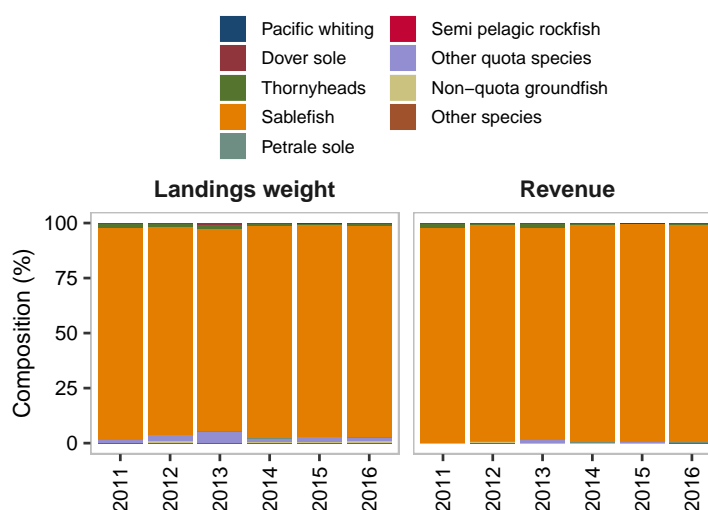


Figure 30: The species composition of catch (left) and revenue (right) in the Groundfish fixed gear with trawl endorsement fishery (%). The data for 2009 and 2010 are not shown because they represent a small group of vessels participating in an exempted fishery permit program.

Total Revenue

Vessels that participated in the Groundfish fixed gear with trawl endorsement fishery also earned revenue from fishing for crab and fishing in Other fisheries (Figure 31 (top)). In 2011 and 2012, a large proportion of total revenue for the Groundfish fixed gear with trawl endorsement vessels came from fishing in Alaska. There are now too few vessels that fish in both Alaska and in the Groundfish fixed gear with trawl endorsement fishery to report the Alaskan revenue. Vessels also earn revenue from participating in the Crab fishery (Figure 31). Of the vessels that participated in the Groundfish fixed gear with trawl endorsement fishery, 14 vessels also participated in the Other fisheries category (Figure 31 (bottom)), which is predominantly the Fixed gear with fixed gear endorsement fishery (75-90%).

Average Net Revenue

Average revenue from participating in the Groundfish fixed gear with trawl endorsement fishery was \$339,000, average variable cost net revenue was \$162,000, and average total cost net revenue was \$119,000 in 2016 (Figure 32). Average revenue was highest in 2011 due to high sablefish prices (Figure 8), but the average ex-vessel revenue in 2015 was only 5.6% less than 2011 and 2016 revenue was only 2.8% less. The average ex-vessel price for

¹⁶ For more information, see: www.opc.ca.gov/2010/05/central-coast-groundfish-project/.

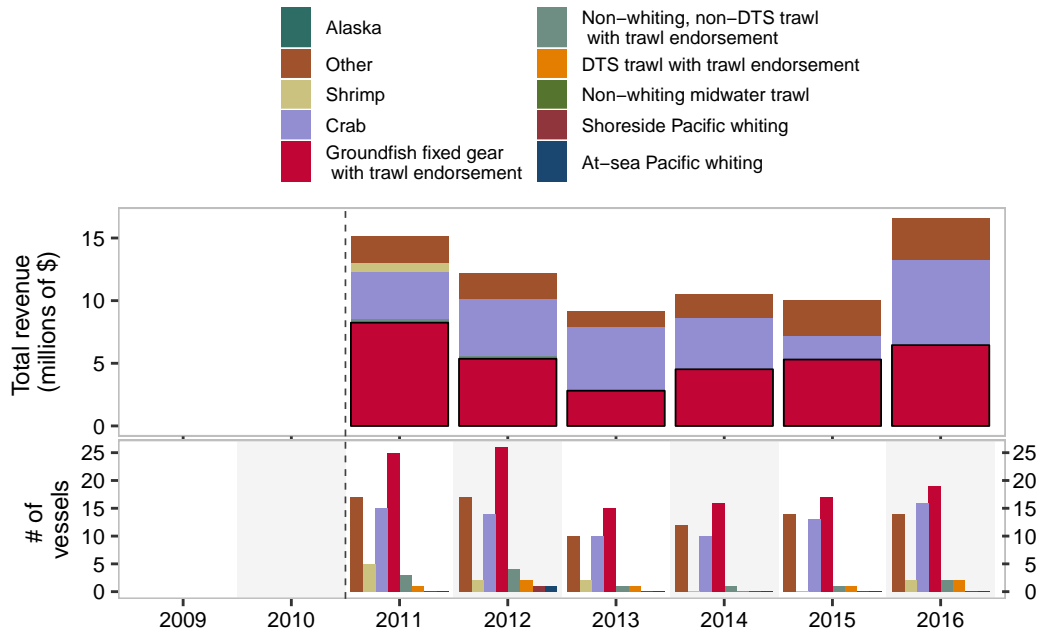


Figure 31: Total ex-vessel revenue earned by vessels that participated in the Groundfish fixed gear with trawl endorsement fishery (black outline) by fishery (millions of 2016 \$) (top) and number of vessels that participated in each fishery (bottom).
 *Some values are suppressed to protect confidential data.

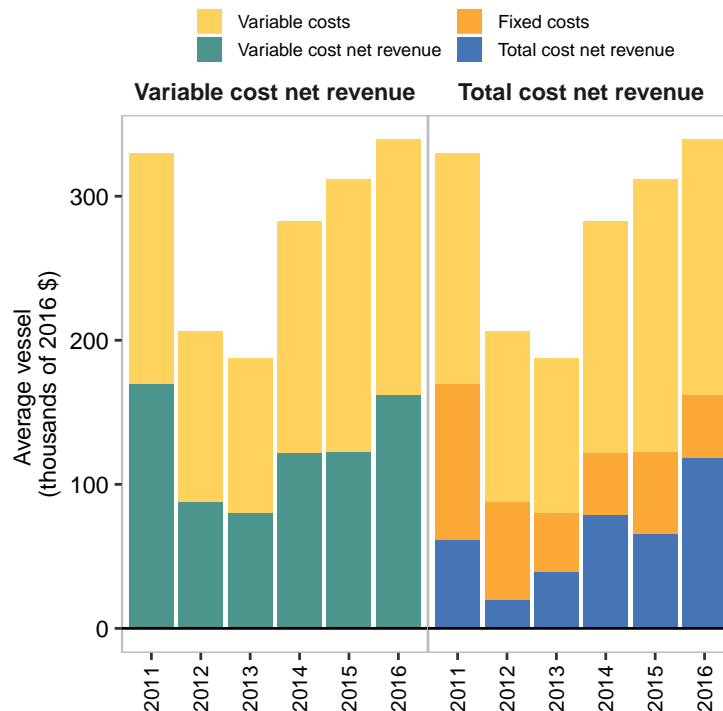


Figure 32: Average variable cost net revenue (ex-vessel revenue minus variable costs) (left), and average total cost net revenue (ex-vessel revenue minus variable costs and fixed costs) (right) from participation in the Groundfish fixed gear with trawl endorsement fishery (thousands of 2016 \$). Dashed line represents the beginning of the catch share program.

sablefish has increased annually from a low of \$1.85 in 2013 to a high of \$2.40 in 2016, the highest it has been since 2011 (\$2.94). The total cost net revenue in 2016 (\$119,000) was higher than any previous year.

Mean costs

The largest mean costs in 2016 were for crew (\$70,900) and captain (\$45,800), followed by vessel and on-board equipment (\$22,100) and bait (\$19,400) (Figure 33). Unlike the trawl fisheries, fixed gear vessels use less fuel, but incur costs on bait that is not required in the trawl fishery. Compared to the DTS trawl with trawl endorsement fishery that spent \$564 per day on fuel, the fixed gear vessels only spent \$282 per day. In 2016, the average expenses on bait were \$16,300 per vessel, or \$709 per day.

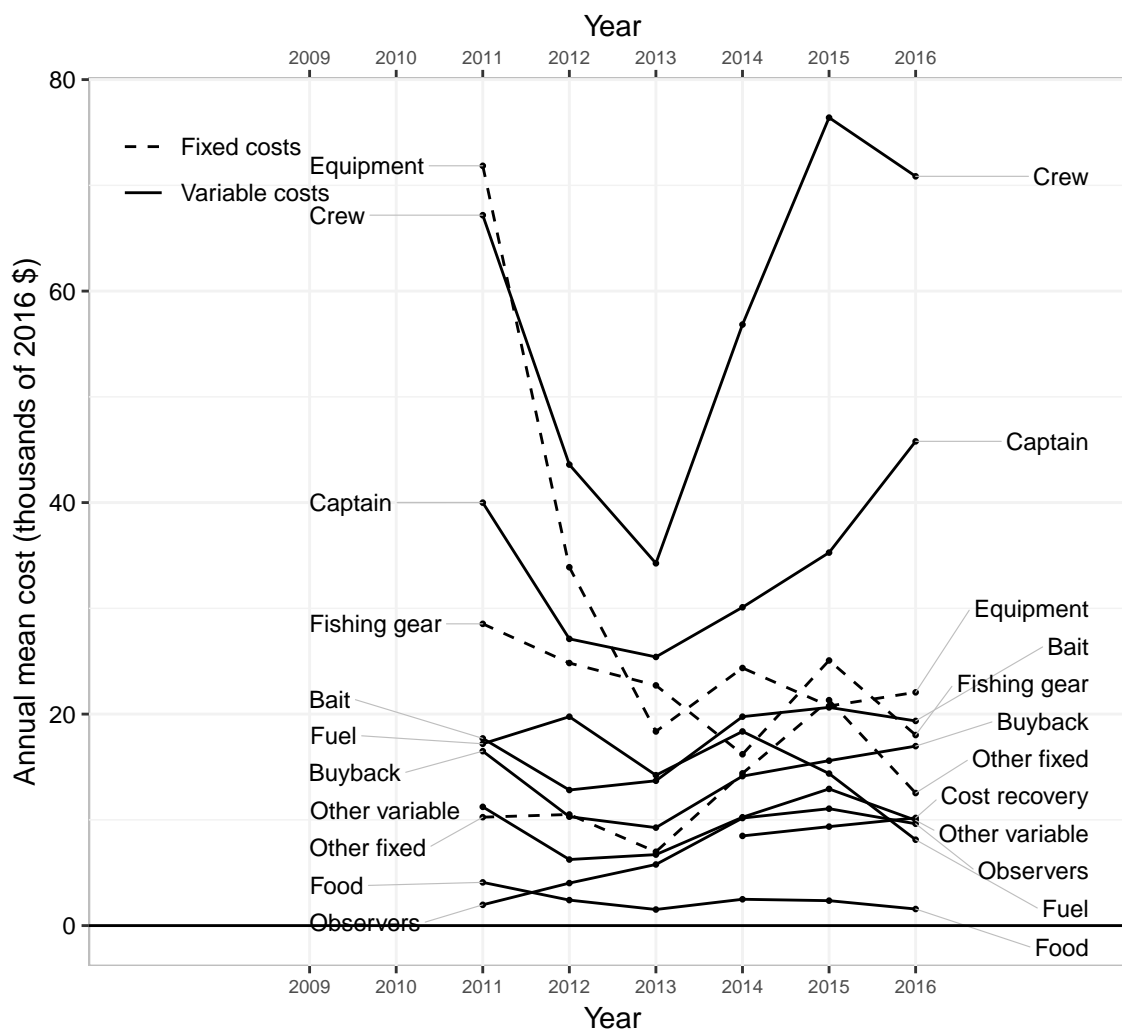


Figure 33: Average fixed (dashed line) and variable costs (solid line) per vessel in the Groundfish fixed gear with trawl endorsement fishery (thousands of 2016 \$). The costs for 2009 and 2010 are not shown here because they were collected from a small group of vessels participating in an exempted fishing permit fishery.

Regional Analysis

In addition to examining how the catch share program is affecting vessels by fishery, it is also important to understand how the effects of the catch share program are being experienced in different regions along the coast. For the purposes of this analysis, we analyze vessels by state: Washington (includes a very small number of vessels that listed Alaska as their home port), Oregon (Newport, Astoria, Tillamook, Brookings, Coos Bay) and California (Crescent City, Eureka, Fort Bragg, San Francisco, Monterey, Morro Bay). As with the rest of the Overview, vessels are included in the analysis for a specific year if they fished with a limited entry trawl permit in that year. Vessels were assigned to a state based on the home port declared on their EDC form.

Washington

The number of vessels with a home port in Washington has remained very consistent, ranging from 15 vessels in 2015 to 19 vessels in 2009 (Figure 34). In 2016, there were 16 vessels, ten of which fished in Alaska, a decline from eleven in 2010 and 2011 but an increase from nine in 2015.

In Washington, the majority of EDC vessels' earnings come from Alaska. Since the beginning of the EDC Program, the highest proportion of revenue from Alaska occurred in 2009 (67% of total revenue), a result of low West Coast revenue in the years leading up to the implementation of the catch share program. Total West Coast earnings for these vessels was lowest in 2009 (\$6.46 million) and highest in 2013 and 2014 when total revenue was approximately \$20 million in both years. In addition to Alaska revenue, trawl vessels in Washington earn a significant proportion of their income from the whiting fisheries (both at-sea and shoreside). In 2015, as a result of low catch in the whiting fisheries, Washington vessels total earnings on the West Coast were less than half (\$10.4 million) the revenue from the previous year. The total West Coast revenue in 2016 was \$15 million, two-thirds of which was from at-sea and shoreside whiting.

The total revenue from the DTS trawl fishery has steadily decreased from \$2.09 million during the pre-catch share period to \$417,000 in 2016. At its highest, the DTS trawl fishery made up 13% of revenue (2009), but has been less than 2% since 2013.

The average total cost net revenue from participation in West Coast fisheries for Washington vessels was \$355,000, a large increase over the pre-catch share period (\$10,300). The average total cost net revenue for these vessels

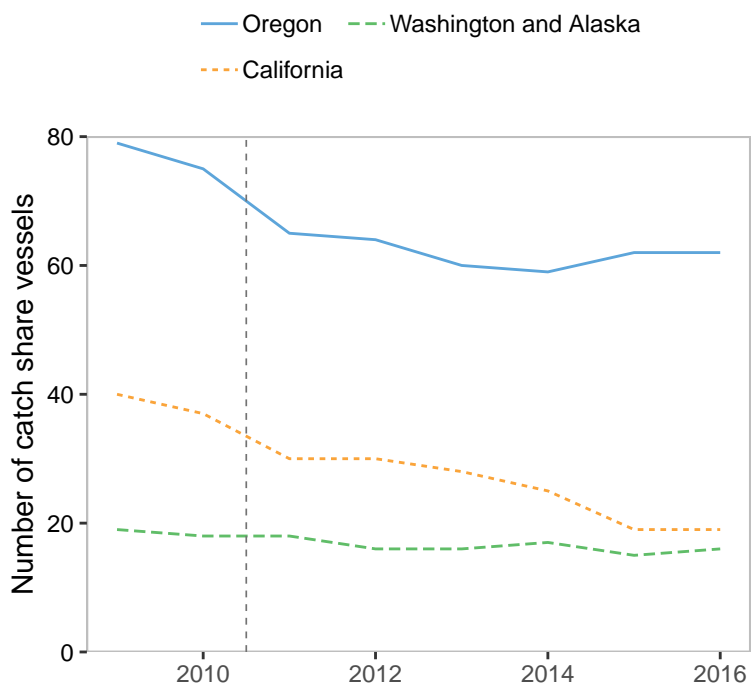


Figure 34: Number of catcher vessels participating in the catch share fisheries by home port region.

was highest in 2013 (\$372,000), but only slightly lower in 2016 (\$355,000)

Oregon

In 2016, there were 62 vessels that fished in the catch share fisheries with home ports in Oregon (Figure 34), 13 of which also fished in Alaska. This was a 19% decrease from the 77 vessels during the pre-catch share period. There had been a steady decrease in the number of Oregon vessels fishing in catch share fisheries since 2009, however, in 2015 and 2016, there were three more vessels that fished compared to 2014.

The vessels that have their home port in Oregon receive a large portion of their income from fishing in Alaska, but they also earn much more income from West Coast activities compared to Washington vessels. Only 21% of Oregon vessels go to Alaska. In 2016, fishing in Alaska made up 21% of total revenue, a decrease from the pre-catch share period of 31%. Similar to Washington, this decrease in total share of revenue from Alaska is a result of relative increases in West Coast revenue. In 2009, total West Coast earnings for these vessels was \$34.9 million compared to \$63.5 million and \$59.8 million in 2013 and 2014 (the two highest years, corresponding with high whiting years), respectively. In 2016, 16% of West Coast earnings came from DTS trawl with trawl endorsement fishery, followed by crab (3%), and shrimp (28%).

The average total cost net revenue for Oregon vessels was higher under catch shares compared to the pre-catch share period (\$63,400). It was highest in 2013 (\$312,000), a 6 fold increase compared to the pre-catch share period. Total cost net revenue in 2016 was the second highest ever at \$262,000 per vessel.

California

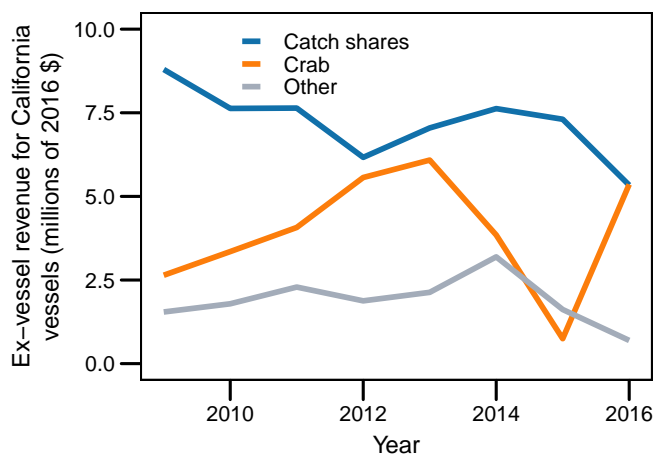


Figure 35: Total ex-vessel revenue (2016 \$) for vessels homeported in California from 2009-2016.

In 2016, there were 19 vessels with home ports in California, representing a 49% decrease from the 38 vessels during the pre-catch share period and a 24% decrease from 2014 (Figure 34). Total ex-vessel revenue from fishing in the catch share program was at an all-time low in 2016 (\$11.4 million), a 16.3% decrease compared to 2015 despite the same number of vessels fishing. There was a 35% decrease in revenue from non-whiting catch share fishing (DTS trawl with trawl endorsement and non-whiting, non-DTS trawl endorsement) but an increase in revenue from participation in the Groundfish fixed gear with trawl endorsement fishery (37.5%).

Throughout the time period 2009-2016, ex-vessel revenue from crab and DTS trawl with trawl endorsement has made up at least 60% of total revenue for California vessels. However, the relative importance of these fisheries depends on the status of the crab fishery. During the pre-catch share period the DTS fishery was dominant, making up 40-50% of total ex-vessel revenue for the vessels (Figure 35). This switched in 2012 and 2013 when crab earnings made up almost 40% of total revenue. Crab earnings decreased 88% between 2013 and 2015, resulting in DTS earnings again dominating the ex-vessel revenue for California vessels. Low crab earnings were the result of

fishery closures and delayed openings as the result of high levels of domoic acid. The crab fishery resumed in 2016, and total earnings from crab reached \$5.36 million.

Earnings from fishing in the DTS trawl with trawl endorsement fishery decreased from 2009 through 2012, steadily increased until 2015, but then dropped to the lowest value to-date (\$3.75 million) in 2016. Ex-vessel revenue in the Non-whiting, non-DTS trawl fishery increased from 2010 to 2014, but then decreased in 2015 and again to \$1.19 million in 2016. In 2016, non-whiting catch share earnings represented 43% of total earnings of California vessels.

The average total cost net revenue per California vessel was higher than the pre-catch share period in all years since the program was implemented, except for 2012 and 2015. The drop in 2012 was a result of a spike in average fixed costs per vessel (\$35,900 compared to \$20,600), whereas the drop in 2015 was a result of crab fishery closures and delayed openings. Total cost net revenue was \$130,000 2014, decreased to \$84,000 in 2015, but increased to just under \$140,000 in 2016.

Catcher Vessel Report

CATCHER VESSEL REPORT

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Catcher Vessel Data Summaries

1 Introduction

1.1 Background

The US West Coast groundfish fishery takes place off the coasts of Washington, Oregon and California, and comprises over 90 different species of fish. Fish are harvested both commercially and recreationally. The commercial fishery has four components: limited entry with a trawl endorsement, limited entry with a fixed gear endorsement, open access, and tribal. In January 2011, the West Coast Limited Entry groundfish trawl fishery transitioned to the West Coast groundfish trawl catch share program. The catch share program consists of cooperatives for the at-sea mothership (including catcher vessels and motherships) and catcher-processor fleets, and an individual fishing quota (IFQ) program for the shorebased trawl fleet.¹

The Economic Data Collection (EDC) Program² was implemented as part of these new regulations to monitor the economic effects of the catch share program. Annual economic data submissions are required from all fishery participants: catcher vessels, motherships, catcher-processors, and first receivers and shorebased processors §50 CFR 660.114. Baseline, pre-catch share, data were submitted in 2011 for the 2009 and 2010 operating years. Data for the first year the fishery operated under the catch share program (2011) were submitted in 2012. The most recent data (2015) were collected in 2014.

This report summarizes the 2009-2016 EDC catcher vessel survey data. The EDC Program has enhanced the quantity and quality of economic information available for analysis and the management of the West Coast groundfish trawl fishery. Prior to the EDC Program, voluntary cost earnings surveys were available for 64% of the shoreside catcher vessels with limited entry groundfish permits with trawl endorsements (trawl fleet) (2003-2004 collection³) and 57% of the fleet for the 2007-2008 collection.⁴ Moreover, no costs and earnings data were available for catcher vessels that delivered to motherships.

¹ Information about the Catch Share Program is available at http://www.westcoast.fisheries.noaa.gov/fisheries/groundfish_catch_shares/.

² Additional information on the EDC Program, including the EDC data collection forms can be found at www.nwafc.noaa.gov/edc

³ Lian, C.E. 2010. West Coast limited entry groundfish trawl cost earnings survey protocols and results for 2004. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-NWFSC-107, 35 p.

⁴ Lian, C.E. 2012. West Coast limited entry groundfish cost earnings survey: Protocol and results for 2008. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-NWFSC-121, 62 p.

1.2 Understanding the report

It is important to remember that the information presented in this report is for all vessels that were required to complete the EDC form, as described above. Throughout the report, these vessels are referred to as EDC vessels. The EDC vessels include: 1) vessels that have historically participated in the trawl fishery and currently still participate; 2) vessels that no longer participate in the trawl fishery but still have a limited entry trawl permit; and 3) vessels that have not historically had a limited entry trawl permit, but have now obtained one to participate in the gear switching program (use of fixed gear is allowed under the program).

The unit of analysis identified in the summary tables varies by the information summarized. There are three different units of analysis, “entities”, “vessels”, and “participants”. An “entity” is defined as a unique combination of an owner or lessee and vessel, whereas a “vessel” refers to all activities related to that vessel, regardless of the number individuals who owned or leased the vessel. Therefore, multiple forms could be submitted for one vessel, because there were multiple owners or lessees. Finally, “participants” refers to the individuals who actually completed the report. Each summary table states whether the count of individuals represents entities or participants.

For each value displayed in the summary data tables, N is displayed. In most cases, N represents the number of responses to the question that are not “NA” and not zero, unless noted otherwise. For example, in Table 9.1, for the 96 vessels that had expenses on ice, the mean expense in 2012 was \$6,400. Therefore, to calculate the average expense for ice for the entire fleet, one would need to multiply the mean by 96 and then divide by the total number of vessels (129).

The one major difference between the baseline forms (2009 and 2010) and 2011-current forms is that vessels that did not fish during the survey period were only required to fill out the first few pages of the form during the baseline collection. The vessels that did not fish in 2009 and 2010 only provided the vessel name, vessel ID, home port, length of the vessel, fuel capacity, and horsepower of main engines, contact information, and permit numbers. Starting with the 2011 forms, all participants have been required to complete the entire form to capture information such as capital investments and earnings from lease or sale of quota or permits.

One last guideline when interpreting the aggregated data is the use of fiscal year. Although participants are identified on a calendar year basis, they complete the form using information based on the fiscal year of the entity. In previous reports, the data were reported by fiscal year. This report reallocates the costs reported on the form to calendar year, primarily accomplished by using information from outside of the EDC Program (primarily fish tickets and At-Sea Hake Observer Program data). For the eight years of data collected from catcher vessels, 91% of entities used a fiscal year that is the same as the calendar year.

There is a 3-year lag for fully finalized EDC data. EDC forms are submitted by September 1 each year for the previous fiscal year (FY2011 data are received in September of 2012), allowing companies to “close their books” and file taxes before completing their EDC forms. The QA/QC process requires approximately 6 months. This means that 2011 EDC data were available in March 2013; however, there is one additional complication. Participants submit data by fiscal year which varies by company and may not completely overlap by calendar year. Although the reports are released at a 2-year lag, the data are not considered finalized until the following year once the complete set of data have been received and processed. As a result, finalized calendar year 2016 data will not be available until Spring 2019.

In order to provide information about the level of variability within each measure reported, a symbol is presented along with all means to indicate the range of the coefficient of variation. The stacked dots included in the tables provide information about the coefficient of variation (CV) of the mean. We use the following scoring:

- represents $CV < 0.5$,
- represents $0.5 \leq CV < 1.0$,
- represents $1.0 \leq CV < 2.0$, and
- represents $2.0 \leq CV$.

For 2009-2016, the highest CV s was 3.2 for capitalized expenditures and expenses on vessel and on-board equipment in 2015. This is reasonable because in a given year there will be a mix of vessels that make very few investments in their vessel and companies that performed complete overhauls of their vessels. These types of fixed costs are inherently heterogeneous across vessels and time. Other types of costs with high variability are purchase of limited entry trawl permits and earnings from lease or sale of permits and quota.

All data submitted via the EDC Program are confidential under 402(b) of the Magnuson-Stevens Act (16 U.S.C. 1801, et seq.) and under NOAA Administrative Order 216-100. In order to protect these data, a rule of three and a rule of 90-10 are implemented. The rule of three requires a response from at least three entities in order to show a summary statistic. The 90-10 rule requires that no single entity's response should comprise over 90 percent of all relevant responses. The tables show a "****" for data points where there were less than three entities reporting the information, and/or if one entity's responses accounted for greater than 90 percent of the average value. Zeroes are shown if all entities only reported zeroes and/or NAs. More information about how confidential data are protected in the EDC Program can be found in the Administration and Operations Report. Simple means are reported for statistics that denote the performance of an average entity (i.e., net revenue) while weighted means are reported for statistics that describe characteristics of the fishery (i.e., ex-vessel prices, markup, recovery rates, etc.). Additionally, "—" is used to denote fields where the question was not asked on the form in that survey year.

Unlike the Overview, all numbers reported in the Data Summaries are generated from the raw responses received from participants and, therefore, are in nominal dollars.

1.3 Purpose of the report

This report, like the other four EDC reports,⁵ has multiple objectives. The first is to provide basic economic data summaries that can be used for a variety of purposes associated with fishery management. Since much of the data collected are confidential under the Magnuson-Stevens Fishery Conservation and Management Act (MSA) of 2007, the data are summarized as averages or totals for each question on the EDC forms. Thus summarized, the reports make the data available to the public for both research and informational purposes.

Second, to provide information about the performance of the catch share program. This includes information that can be used to monitor whether and to what degree the goals of the program are being met. It is expected that additional modeling will provide increased detail about program impacts. These reports and underlying data and analyses are the basis for the 5-year review of the catch share program that is mandated in the MSA, as well as the NMFS National Catch Shares Performance Indicators.

⁵ In addition to the catcher vessel report, there are four companion reports:

- Economic Data Collection Program, Administration and Operations Report (May 2016)
- Economic Data Collection Program, Catcher-Processor Draft Report, 2009-2015 (June 2017)
- Economic Data Collection Program, Mothership Draft Report, 2009-2015 (June 2017)
- Economic Data Collection Program, First Receiver and Shorebased Processor Draft Report, 2009-2015 (June 2017)

Third, the reports serve as the basis for economic models that are used as part of the PFMC biennial specification process for groundfish management. These models include the IO-PAC model,⁶ as well as estimates of revenue, costs, and net revenue.

Lastly, and perhaps most importantly, the data reports are expected to provide a useful catalyst for feedback on the data collected and its analysis.

The Administration and Operations Report describes the EDC Program administration and fielding of the surveys, the EDC forms, data quality controls and quality checks and data processing, and safeguarding confidential information. The other EDC reports provide basic data summaries of the catcher-processor, mothership, and first receiver and shorebased processor forms.

1.4 Catcher vessel form administration

Completion of EDC forms is mandatory for participants in the catch share program. Any owner, lessee, or charterer of a catcher vessel registered to a limited entry groundfish permit with a trawl endorsement (limited entry trawl permit) is required to complete an EDC form §660.114(b)(1). For a permit owner, a limited entry trawl permit application (including MS/CV-endorsed limited entry trawl permit) will not be considered complete until the required EDC form for that permit owner associated with that permit is submitted, as specified at §660.25(b)(4)(i). For a vessel owner, participation in the groundfish fishery (including, but not limited to, changes in vessel registration, vessel account actions, or if own QS permit, issuance of annual QP or IBQ pounds) will not be authorized until the required EDC form for that owner for that vessel is submitted, as specified, in part, at §660.25(b)(4)(v) and §660.140(e). For a vessel lessee or charterer, participation in the groundfish fishery (including, but not limited to, issuance of annual QP or IBQ pounds if own QS or IBQ) will not be authorized, until the required EDC form for their operation of that vessel is submitted.

A calendar year is used to determine which vessels meet the criteria. For example, in 2017, data were collected from all owners, lessees, and charters of a catcher vessel registered to a limited entry trawl permit during 2016. The forms are fielded on this schedule in order to allow participants the time necessary to complete their taxes, which may contain some information that is required on the EDC forms. Participants are identified using contact information provided by the Northwest Regional Office - Permit Office (Permit Office).

If a form has missing information, or the information provided on the form is believed to be incorrect, EDC Program staff attempt to contact the participant to correct the information. On occasion, the participant cannot be reached or the participant cannot provide the missing information. In these cases, the missing or inaccurate data are treated on a case-by-case basis during analysis as documented in the Administration and Operations Report. Data are validated and verified with external data sources whenever possible. These data sources include the Permit Office, state fish tickets, the At-Sea Hake Observer Program data, and the Coast Guard.

1.5 About the survey participants

The EDC catcher vessel participants are identified as any owner, lessee, or charterer of a vessel with a limited entry trawl permit. This includes catcher vessels that deliver Pacific whiting to motherships at sea (At-sea whiting fishery), catcher vessels that deliver whiting to shorebased facilities (Shorebased whiting fishery), and catcher

⁶ Leonard, J., and P. Watson. 2011. Description of the input-output model for Pacific Coast fisheries. U.S. Dept. Commer., NOAA Tech. Memo. NMFS-NWFSC-111, 64 p.

vessels that delivery non-whiting groundfish to shorebased facilities (Non-whiting groundfish fishery). In addition to these fisheries, many vessels also participate in one or both of the state fisheries for shrimp and crab. The other prevalent activity is fishing in Alaska.

The individuals that complete the forms are as diverse as the types of fisheries in which the vessels participate. This adds to the complexity of developing the EDC forms, because the questions on the forms must be understood by fishermen, family members, accountants, bookkeepers, and chief financial officers, to name a few. Oftentimes, the forms are completed by multiple individuals since different people manage different parts of the business. For example, the captain of the vessel might know best how much fuel the vessel uses on a daily basis, but the bookkeeper might have the best information about how much was spent on fuel during the year.

2 Survey Response Rates

For the 2016 Catcher Vessel EDC forms, 99.3% of all required forms were complete.⁷ This is an increase from the 2009 and 2010 collection, when 88.1% and 92.6% were complete, respectively (Table 2.1). To date, no entity⁸ has been unable to renew a limited entry trawl groundfish permit due to a missing or incomplete EDC form. This means that the remaining forms that were received incomplete or never received correspond to participants that are no longer in any West Coast federal fishery.

Table 2.1: Form status. Number of complete forms, number of incomplete forms, and number of forms that were never received (N = number of forms, % = percent of all forms due in survey year).

Form status	2009		2010		2011		2012		2013		2014		2015		2016	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Complete	148	88.1%	150	92.6%	166	96.5%	154	98.7%	150	98.7%	149	100.0%	145	99.3%	138	99.3%
Incomplete	6	3.6%	1	0.6%	2	1.2%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Not received	14	8.3%	11	6.8%	4	2.3%	2	1.3%	2	1.3%	0	0.0%	1	0.7%	1	0.7%

For most of the forms, there is a one-to-one relationship between a vessel, vessel owner, and vessel operator. In these cases, there are no lessees of the vessel and one form is submitted for the vessel each year. More than one form is submitted for a particular vessel when the vessel is leased by a third party, or when the vessel is sold during the survey year. The most common occurrence with two forms submitted for one vessel is when the owner of the vessel submits one form and the lessee of the vessel submits another form. Generally, only the lessee operated the vessel during the fiscal year, but occasionally both the owner and the lessee will operate the vessel (Table 2.2).

⁷ For explanation of the term complete, please refer to the Administration and Operations Report section regarding regulations for complete EDC forms.

⁸ An "entity" is defined as a unique combination of an owner or lessee and vessel, whereas a "vessel" refers to all activities related to that vessel, regardless of the number individuals who owned or leased the vessel.

Table 2.2: Number of forms, entities, and vessels by activity. Number of required forms, entities that fished, vessels that harvested, vessels that were leased, lease contracts, vessels that were fished by more than one entity, and vessels that were sold during the annual survey qualifying period. An entity is defined as a unique combination of an owner or lessee and vessel, whereas a vessel refers to all activities related to that vessel, regardless of the number of individuals who owned or leased the vessel.

Activity	2009	2010	2011	2012	2013	2014	2015	2016
Required forms	168	162	172	156	152	149	146	139
Entities that fished	133	130	143	133	127	130	126	115
Vessels that fished on the West Coast or Alaska	132	129	138	132	124	128	119	114
Vessels that fished on the West Coast	129	128	132	128	119	120	114	112
Vessels that fished in Alaska	31	31	34	28	26	27	25	24
Vessels that were leased	11	8	9	7	7	6	7	6
Lease contracts	12	9	9	7	7	6	7	6
Vessels fished by multiple entities	1	1	5	1	2	2	5	1
Vessels sold	1	8	8	3	7	3	7	6

3 Vessel Participation on the West Coast and in Alaska

Participants provide the total number of days at sea by fishery on the West Coast and in Alaska. They are instructed to count partial days as full days. The current categories of West Coast fisheries are

- West Coast whiting trawl gear,
- West Coast midwater trawl gear,
- West Coast groundfish trawl gear,
- Groundfish fixed gear with trawl endorsement,
- Groundfish fixed gear with fixed gear endorsement,
- Shrimp,
- Crab,
- Pacific halibut,
- California halibut,
- Salmon,
- Tuna, and
- Other fisheries.

The activity categories on the EDC form have changed over the course of the data collection in response to feedback from participants as well as changes in fishing behavior. The first change was on the 2011 form when the category “Fishing in Alaska or other fisheries” was split into “Fishing in Alaska” and “Other West Coast fisheries”. The following year another split was made to distinguish non-fishing operations on the West Coast from those in Alaska. To do that, the category “Chartering or research days” (Table 4.17) was split into “Chartering, research, or tendering on the West Coast” (Table 4.19) and “Chartering, research, or tendering in Alaska” (Table 4.20).

Starting with the 2014 form, two fisheries were each split into two additional categories; “West Coast groundfish fixed gear” was split out by permit endorsement (fixed gear or trawl); and “Halibut” was split into Pacific halibut and California halibut. The first change was made in response to participant feedback that fuel use differs between permit endorsements because there are different discard regulations for the two permit endorsements and therefore fisher behavior changes according to the permit they are fishing. The Halibut fishery was changed because EDC vessels fish in both the California halibut and Pacific halibut fisheries, but the original question was designed only for the Pacific halibut fishery. The Pacific halibut is a fixed gear fishery and so reporting the speed while fishing was not required, whereas the California halibut fishery is a trawl fishery and therefore participants need to provide their speed while fishing.

Historically there was a non-whiting midwater groundfish fishery, targeting semi-pelagic rockfish such as yellowtail and widow rockfish, but the fishery had been closed since widow rockfish was declared overfished in 2001. In 2012, vessels began participating in the Non-whiting midwater trawl fishery as the result of the removal of widow rockfish from the overfished list in 2011.⁹ As a result, a few vessels reentered the fishery in 2012, although the annual catch limit for widow rockfish was not raised until 2013. Between 2011 and 2016, the total quota for widow

⁹ NMFS 2011. Status of the widow rockfish resource in 2011: http://www.pcouncil.org/wp-content/uploads/Widow_2011_Assessment.pdf.

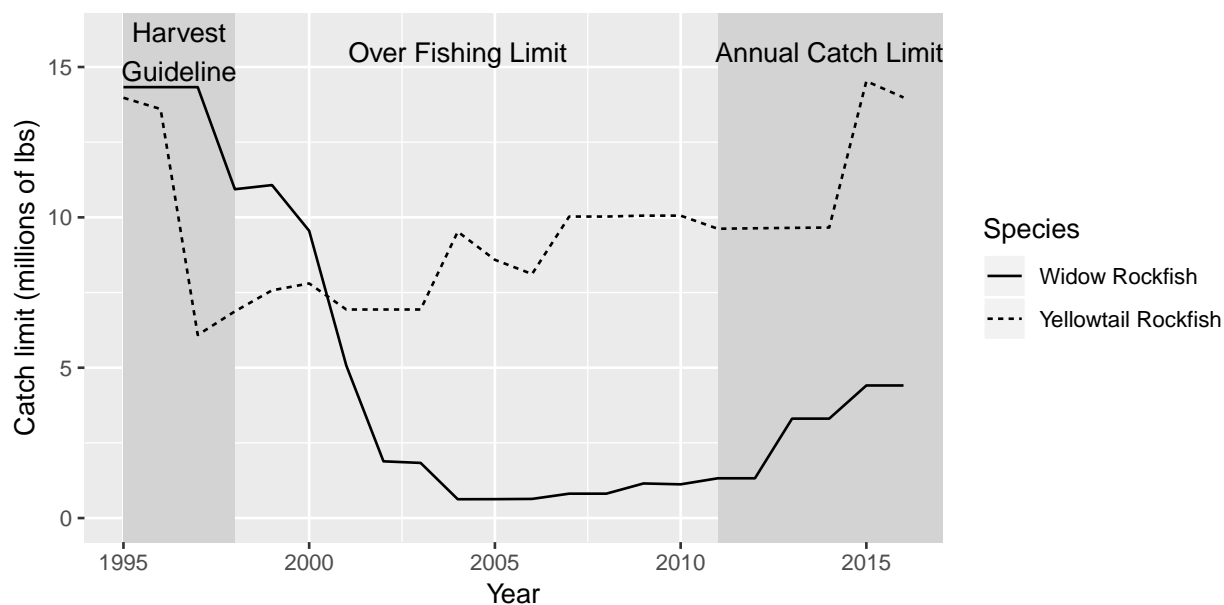


Figure 36: Catch limits for widow rockfish and yellowtail rockfish (1995-2016).

increased 3 fold from 1.32 million pounds to 4.41 million pounds ³⁶. Yellowtail rockfish quota, the other target species in the non-whiting midwater fishery, had remained relatively constant since the implementation of the catch share program (9.64 million pounds), but was increased by 40% in 2015 to 14.5 million pounds. The EDC form did not begin asking about participation in the non-whiting midwater fishery until 2015, when the additional fishery “West Coast midwater trawl gear” was added.

Table 3.1: Average days at sea. Average days at sea by activity for EDC vessels (N = number of EDC vessels with non-zero, non-NA responses.) See above for explanations of changes to the data collection form across years.

Fishery	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Pacific whiting	35 [°]	40	46 [°]	41	62 [°]	33	68 [°]	29	69 [°]	30	81 [°]	30	74 [°]	26	98 [°]	28
Non-whiting midwater trawl	—	—	—	—	—	—	—	—	—	—	—	—	11 [°]	13	10 [°]	10
Groundfish with trawl gear	68 [°]	103	59 [°]	98	51 [°]	74	53 [°]	67	56 [°]	71	52 [°]	64	46 [°]	63	49 [°]	57
Groundfish with fixed gear	29 [°]	7	63 [°]	8	38 [°]	26	45 [°]	25	31 [°]	20	—	—	—	—	—	—
Groundfish fixed gear with a trawl permit	—	—	—	—	—	—	—	—	—	—	29 [°]	21	31 [°]	18	31 [°]	18
Groundfish fixed gear with a fixed gear permit	—	—	—	—	—	—	—	—	—	—	27 [°]	9	26 [°]	11	38 [°]	9
Shrimp	33 [°]	29	39 [°]	33	44 [°]	40	47 [°]	38	45 [°]	38	57 [°]	41	70 [°]	48	59 [°]	35
Crab	40 [°]	55	38 [°]	57	37 [°]	65	35 [°]	64	36 [°]	67	40 [°]	62	26 [°]	54	37 [°]	58
Halibut	26 [°]	6	30 [°]	6	18 [°]	6	23 [°]	6	23 [°]	5	—	—	—	—	—	—
Pacific halibut	—	—	—	—	—	—	—	—	—	—	—	0	2 [°]	4	***	***
California halibut	—	—	—	—	—	—	—	—	—	—	50 [°]	4	43 [°]	3	51 [°]	3
Salmon	0	***	***	***	19 [°]	5	28 [°]	10	29 [°]	7	20 [°]	10	20 [°]	3	***	***
Tuna	14 [°]	9	21 [°]	10	20 [°]	5	17 [°]	10	6 [°]	6	8 [°]	8	21 [°]	9	24 [°]	8
Fishing in Alaska or other fisheries	102 [°]	32	111 [°]	31	—	—	—	—	—	—	—	—	—	—	—	—
Fishing in Alaska	—	—	—	—	125 [°]	36	110 [°]	30	117 [°]	28	121 [°]	29	127 [°]	25	116 [°]	26
Steaming between West Coast and Alaska	19 [°]	30	19 [°]	33	19 [°]	34	18 [°]	32	15 [°]	30	16 [°]	30	18 [°]	28	19 [°]	29
Other West Coast Fisheries	—	—	—	—	***	***	***	***	19 [°]	6	***	***	0	0	0	0
Chartering or research	34 [°]	11	33 [°]	11	36 [°]	12	—	—	—	—	—	—	—	—	—	—
Chartering, research, or tendering on the West Coast	—	—	—	—	—	—	46 [°]	7	52 [°]	9	63 [°]	9	36 [°]	10	36 [°]	8
Chartering, research, or tendering in Alaska	—	—	—	—	—	—	43 [°]	5	60 [°]	5	67 [°]	7	57 [°]	7	63 [°]	7

Table 3.2: Total days at sea. Total days at sea by activity for EDC vessels (N = number of EDC vessels with non-zero, non-NA responses. See above for explanations of changes to the data collection form across years.

Fishery	2009		2010		2011		2012		2013		2014		2015		2016	
	Total	N	Total	N	Total	N	Total	N	Total	N	Total	N	Total	N	Total	N
Pacific whiting	1,400	40	1,900	41	2,051	33	1,965	29	2,060	30	2,440	30	1,932	26	2,739	28
Non-whiting midwater trawl	—	—	—	—	—	—	—	—	—	—	—	—	145	13	104	10
Groundfish with trawl gear	6,977	103	5,739	98	3,740	74	3,528	67	3,978	71	3,307	64	2,875	63	2,813	57
Groundfish with fixed gear	201	7	507	8	985	26	1,122	25	611	20	—	—	—	—	—	—
Groundfish fixed gear with a trawl permit	—	—	—	—	—	—	—	—	—	—	605	21	562	18	554	18
Groundfish fixed gear with a fixed gear permit	—	—	—	—	—	—	—	—	—	—	240	9	285	11	346	9
Shrimp	952	29	1,289	33	1,750	40	1,798	38	1,728	38	2,348	41	3,364	48	2,073	35
Crab	2,204	55	2,159	57	2,420	65	2,210	64	2,397	67	2,476	62	1,430	54	2,127	58
Halibut	153	6	179	6	110	6	139	6	116	5	—	—	—	—	—	—
Pacific halibut	—	—	—	—	—	—	—	—	—	—	0	0	8	4	***	***
California halibut	—	—	—	—	—	—	—	—	—	—	198	4	128	3	152	3
Salmon	0	0	***	***	93	5	283	10	202	7	195	10	61	3	***	***
Tuna	129	9	208	10	98	5	171	10	34	6	60	8	189	9	188	8
Fishing in Alaska or other fisheries	3,273	32	3,456	31	—	—	—	—	—	—	—	—	—	—	—	—
Fishing in Alaska	—	—	—	—	4,488	36	3,304	30	3,285	28	3,511	29	3,165	25	3,013	26
Steaming between West Coast and Alaska	575	30	616	33	636	34	583	32	448	30	495	30	513	28	545	29
Other West Coast Fisheries	—	—	—	—	***	***	***	***	116	6	***	***	0	0	0	0
Chartering or research	376	11	366	11	434	12	—	—	—	—	—	—	—	—	—	—
Chartering, research, or tendering on the West Coast	—	—	—	—	—	—	324	7	466	9	569	9	360	10	285	8
Chartering, research, or tendering in Alaska	—	—	—	—	—	—	217	5	299	5	469	7	398	7	438	7

3.1 Trips to Alaska

The number of trips that were made between the West Coast and Alaska provide additional insight into the patterns of participation. Table 3.3 shows the number of vessels that took up to four one-way trips to Alaska.

Table 3.3: Trips to Alaska. The number of EDC vessels making the given number of one-way trips between the West Coast and Alaska.

Number of one-way trips	2009	2010	2011	2012	2013	2014	2015	2016
1	1	5	3	1	3	3	0	1
2	22	20	25	26	24	24	25	19
3	2	2	1	2	2	2	1	1
4	5	6	3	3	1	1	3	8

4 Home Port

Vessel home port information is especially useful for understanding how the catch share program may affect communities. Among other uses, home port is commonly used as a method for assigning economic activity to communities. There are many ways to define home port, including the home port listed on Coast Guard registrations and the port where the vessel made the most landings. Table 4.1 shows the number of entities by home port according to information submitted by participants. Home ports provided on the EDC forms are mapped to the IO-PAC port groupings.¹⁰ These port groupings are also consistent with those used in the PFMC's biennial groundfish management specification process. The ports with the highest concentration of EDC entities are Newport, Astoria, and Coos Bay.

In addition to understanding where vessels call their home port, it is important to examine how the home port relates to particular fisheries. Tables 4.2 through 4.17 show the average days at sea by home port and fishery. This provides information about how changes in management for a particular fishery could affect specific port communities. For example, changes in the Shoreside Pacific whiting fishery could have a strong effect on Coos Bay, but a change in the At-sea Pacific whiting fishery might not have a noticeable effect in that port.

¹⁰ Leonard, J., and P. Watson. 2011. Description of the input-output model for Pacific Coast fisheries. U.S. Dept. Commer., NOAA Tech. Memo. NMFS-NWFSC-111, 64 p.

Table 4.1: Vessel home port. Number of entities by home port as reported on the EDC form (N = number of entities, % = percent of total entities in survey year. An entity is defined as a unique combination of an owner or lessee and vessel, whereas a vessel refers to all activities related to that vessel, regardless of the number individuals who owned or leased the vessel).

Home port	2009		2010		2011		2012		2013		2014		2015		2016	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Alaska	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***
Blaine	—	—	—	—	—	—	—	—	—	—	—	—	***	***	***	***
Bellingham Bay	3	2%	3	2%	***	***	***	***	***	***	***	***	—	—	—	—
La Conner	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***
Everett	—	—	—	—	—	—	—	—	—	—	—	—	—	—	***	***
Seattle	9	6%	10	7%	10	7%	7	5%	7	6%	10	8%	10	9%	10	9%
Tacoma	—	—	—	—	—	—	***	***	***	***	***	***	***	***	***	***
Westport	3	2%	***	***	***	***	***	***	***	***	***	***	***	***	***	***
Willapa Bay	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***
Ilwaco or Chinook	***	***	***	***	***	***	***	***	***	***	***	***	—	—	—	—
Astoria	23	16%	23	17%	26	19%	23	18%	21	17%	20	16%	22	19%	23	20%
Tillamook or Garibaldi	5	4%	5	4%	4	3%	4	3%	***	***	***	***	***	***	***	***
Newport	25	18%	24	17%	21	16%	21	16%	22	18%	22	18%	24	21%	23	20%
Winchester Bay	—	—	—	—	—	—	—	—	—	—	—	—	***	***	***	***
Charleston or Coos Bay	20	14%	19	14%	19	14%	18	14%	17	14%	18	14%	16	14%	15	13%
Bandon	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***
Brookings	8	6%	8	6%	8	6%	8	6%	8	6%	8	6%	8	7%	8	7%
Crescent City	7	5%	7	5%	7	5%	6	5%	6	5%	5	4%	4	3%	4	4%
Eureka	10	7%	10	7%	8	6%	7	5%	7	6%	8	6%	6	5%	7	6%
Fort Bragg	7	5%	7	5%	7	5%	8	6%	7	6%	7	6%	7	6%	7	6%
San Francisco	3	2%	4	3%	***	***	***	***	***	***	***	***	***	***	***	***
Princeton or Half Moon Bay	4	3%	5	4%	5	4%	5	4%	5	4%	5	4%	3	3%	***	***
Santa Cruz	***	***	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Moss Landing	—	—	—	—	—	—	***	***	—	—	—	—	—	—	—	—
Monterey	***	***	***	***	***	***	***	***	3	2%	***	***	***	***	***	***
San Luis Obispo	***	***	***	***	***	***	***	***	***	***	—	—	—	—	—	—
Morro Bay	6	4%	4	3%	5	4%	5	4%	6	5%	5	4%	3	3%	***	***

Table 4.2: Pacific whiting fishery days at sea by home port. Average number of days vessels participated in the Pacific whiting fishery on the West Coast by home port reported on the EDC form (N = number of EDC vessels with non-zero, non-NA responses). See description on page 60 for an explanation of EDC form changes (annotated with —) over time.

Home port	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Alaska	***	***	***	***	—	—	—	—	***	***	***	***	***	***	***	***
Bellingham Bay	***	***	***	***	—	—	***	***	***	***		0	—	—	—	—
La Conner	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***
Seattle	24.8 [†]	8	52.9 [†]	10	65.6 [†]	7	58.8 [†]	5	59.3 [†]	6	66.0 [†]	8	59.0 [†]	7	90.4 [†]	8
Westport	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***
Astoria	55.7 [†]	3	69.0 [†]	3	54.7 [†]	3	***	***	***	***	***	***		0	***	***
Tillamook or Garibaldi	***	***	***	***	—	—		0		0		0		0	—	—
Newport	31.4 [†]	16	42.8 [†]	16	72.3 [†]	15	70.2 [†]	14	70.7 [†]	15	86.3 [†]	15	81.4 [†]	14	105.2 [†]	14
Charleston or Coos Bay	28.3 [†]	3	***	***	***	***	***	***		0		0		0		0
Brookings	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***
Crescent City	***	***	***	***		0		0		0		0		0		0
Eureka	***	***	***	***	—	—		0		0		0		0		0
San Francisco	***	***	***	***	***	***	***	***		0		0		0		0

Table 4.3: Non-whiting midwater trawl fishery days at sea by home port. Average number of days vessels participated in the Non-whiting midwater trawl fishery on the West Coast by home port reported on the EDC form (N = number of EDC vessels with non-zero, non-NA responses). See description on page 60 for an explanation of EDC form changes (annotated with —) over time.

Home port	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Alaska	—	—	—	—	—	—	—	—	—	—	—	—	***	***	***	***
La Conner	—	—	—	—	—	—	—	—	—	—	—	—	***	***	***	***
Westport	—	—	—	—	—	—	—	—	—	—	—	—	***	***	***	***
Astoria	—	—	—	—	—	—	—	—	—	—	—	—	6.2 [†]	4	6.3 [†]	3
Newport	—	—	—	—	—	—	—	—	—	—	—	—	12.2 [†]	6	12.5 [†]	4
Brookings	—	—	—	—	—	—	—	—	—	—	—	—		0		0

Table 4.4: Groundfish with trawl gear fishery days at sea by home port. Average number of days vessels participated in the Groundfish with trawl gear fishery on the West Coast by home port reported on the EDC form (N = number of EDC vessels with non-zero, non-NA responses). See description on page 60 for an explanation of EDC form changes (annotated with —) over time.

Home port	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Alaska	—	—	—	—	***	***	***	***		0		0	—	—	—	—
Bellingham Bay	***	***	***	***	***	***		0		0		0	—	—	—	—
La Conner	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***
Seattle	***	***	***	***	***	***		0		0		0		0		0
Westport	***	***	***	***		0	***	***	***	***	***	***	***	***	***	***
Willapa Bay	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***
Ilwaco or Chinook	***	***	***	***	***	***	***	***	***	***	***	***	—	—	—	—
Astoria	87.9 [†]	18	85.1 [†]	17	76.7 [†]	17	86.5 [†]	15	96.9 [†]	14	90.2 [†]	13	73.7 [†]	15	78.8 [†]	16
Tillamook or Garibaldi	83.2 [†]	5	65.8 [†]	5	***	***	***	***	***	***		0		0	—	—
Newport	56.0 [†]	15	45.1 [†]	15	21.1 [†]	9	26.6 [†]	8	37.7 [†]	7	37.4 [†]	7	32.0 [†]	10	36.4 [†]	8
Charleston or Coos Bay	52.4 [†]	17	48.1 [†]	17	43.8 [†]	11	48.2 [†]	12	31.6 [†]	13	18.7 [†]	12	24.2 [†]	9	18.2 [†]	8
Bandon	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***
Brookings	55.0 [†]	7	59.1 [†]	7	46.5 [†]	6	55.2 [†]	4	86.8 [†]	5	50.0 [†]	6	40.7 [†]	6	47.3 [†]	6
Crescent City	51.1 [†]	7	43.7 [†]	6	22.7 [†]	3	29.5 [†]	4	27.2 [†]	4	33.3 [†]	3	***	***	30.0 [†]	3
Eureka	70.2 [†]	8	57.0 [†]	8	48.9 [†]	8	43.0 [†]	7	51.0 [†]	7	53.0 [†]	7	50.3 [†]	6	55.6 [†]	5
Fort Bragg	66.7 [†]	7	56.7 [†]	7	44.2 [†]	6	41.8 [†]	5	48.3 [†]	6	49.2 [†]	6	51.0 [†]	5	43.0 [†]	5
San Francisco	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***
Princeton or Half Moon Bay	45.2 [†]	4	34.5 [†]	4	***	***	***	***	***	***	***	***		0		0
Monterey	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***
San Luis Obispo	***	***	***	***	—	—		0	—	—	—	—	—	—	—	—
Morro Bay	***	***		0		0		0	***	***	***	***	***	***	—	—

Table 4.5: Groundfish with fixed gear fishery days at sea by home port. Average number of days vessels participated in the Groundfish with fixed gear fishery on the West Coast by home port reported on the EDC form (N = number of EDC vessels with non-zero, non-NA responses). See description on page 60 for an explanation of EDC form changes (annotated with —) over time.

Home port	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Alaska	—	—	—	—	***	***	—	—		0	—	—	—	—	—	—
Bellingham Bay		0		0	—	—	***	***	***	***	—	—	—	—	—	—
Seattle		0		0	51.0 [‡]	4	73.3 [‡]	3	***	***	—	—	—	—	—	—
Tacoma	—	—	—	—	—	—	***	***	***	***	—	—	—	—	—	—
Astoria	***	***	***	***	41.6 [‡]	5	55.3 [‡]	6	37.8 [‡]	6	—	—	—	—	—	—
Tillamook or Garibaldi	***	***	***	***	***	***		0		0	—	—	—	—	—	—
Newport	***	***	***	***	42.0 [‡]	3	53.3 [‡]	3	***	***	—	—	—	—	—	—
Charleston or Coos Bay		0		0	***	***	***	***		0	—	—	—	—	—	—
Bandon		0		0	***	***		0	—	—	—	—	—	—	—	—
Brookings		0		0	***	***	***	***	***	***	—	—	—	—	—	—
Fort Bragg	—	—	—	—	***	***	***	***	***	***	—	—	—	—	—	—
San Francisco	—	—	***	***		0		0		0	—	—	—	—	—	—
Princeton or Half Moon Bay	—	—	***	***	***	***	***	***	***	***	—	—	—	—	—	—
Moss Landing	—	—	—	—	—	—	***	***	—	—	—	—	—	—	—	—
Monterey	—	—	—	—	—	—	***	***		0	—	—	—	—	—	—
San Luis Obispo	—	—	—	—	***	***	***	***	—	—	—	—	—	—	—	—
Morro Bay	31.0 [‡]	4	85.3 [‡]	3	33.8 [‡]	5	28.5 [‡]	4	30.0 [‡]	5	—	—	—	—	—	—

Table 4.6: Groundfish fixed gear with a trawl permit fishery days at sea by home port. Average number of days vessels participated in the Groundfish fixed gear with a trawl permit fishery on the West Coast by home port reported on the EDC form (N = number of EDC vessels with non-zero, non-NA responses). See description on page 60 for an explanation of EDC form changes (annotated with —) over time.

Home port	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Alaska	—	—	—	—	—	—	—	—	—	—	***	***	—	—	—	—
Blaine	—	—	—	—	—	—	—	—	—	—	—	—	***	***	***	***
Bellingham Bay	—	—	—	—	—	—	—	—	—	—	***	***	—	—	—	—
Seattle	—	—	—	—	—	—	—	—	—	—	***	***	***	***	***	***
Tacoma	—	—	—	—	—	—	—	—	—	—	—	—	***	***	***	***
Astoria	—	—	—	—	—	—	—	—	—	—	38.2 [†]	5	42.4 [†]	5	36.0 [†]	5
Newport	—	—	—	—	—	—	—	—	—	—	51.7 [†]	3	39.0 [†]	4	26.8 [†]	5
Winchester Bay	—	—	—	—	—	—	—	—	—	—	—	—	***	***	***	***
Charleston or Coos Bay	—	—	—	—	—	—	—	—	—	—	—	0	***	***	***	***
Eureka	—	—	—	—	—	—	—	—	—	—	***	***	—	0	—	0
Fort Bragg	—	—	—	—	—	—	—	—	—	—	***	***	***	***	***	***
Princeton or Half Moon Bay	—	—	—	—	—	—	—	—	—	—	***	***	***	***	—	0
Monterey	—	—	—	—	—	—	—	—	—	—	***	***	—	—	***	***
Morro Bay	—	—	—	—	—	—	—	—	—	—	18.2 [†]	4	***	***	***	***

Table 4.7: Groundfish fixed gear with a fixed gear permit fishery days at sea by home port. Average number of days vessels participated in the Groundfish fixed gear with a fixed gear permit fishery fishery on the West Coast by home port reported on the EDC form (N = number of EDC vessels with non-zero, non-NA responses). See description on page 60 for an explanation of EDC form changes (annotated with —) over time.

Home port	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Alaska	—	—	—	—	—	—	—	—	—	—	***	***	—	—	—	—
Blaine	—	—	—	—	—	—	—	—	—	—	—	—	***	***	***	***
Bellingham Bay	—	—	—	—	—	—	—	—	—	—	***	***	—	—	—	—
Seattle	—	—	—	—	—	—	—	—	—	—	***	***	***	***	***	***
Tacoma	—	—	—	—	—	—	—	—	—	—	***	***	***	***	***	***
Astoria	—	—	—	—	—	—	—	—	—	—	***	***	***	***	***	***
Tillamook or Garibaldi	—	—	—	—	—	—	—	—	—	—		0	***	***	—	—
Newport	—	—	—	—	—	—	—	—	—	—	***	***	***	***	***	***
Winchester Bay	—	—	—	—	—	—	—	—	—	—	—	—	***	***	***	***
Charleston or Coos Bay	—	—	—	—	—	—	—	—	—	—		0	***	***	***	***
Morro Bay	—	—	—	—	—	—	—	—	—	—	***	***	***	***	—	—

Table 4.8: Shrimp fishery days at sea by home port. Average number of days vessels participated in the Shrimp fishery on the West Coast by home port reported on the EDC form (N = number of EDC vessels with non-zero, non-NA responses). See description on page 60 for an explanation of EDC form changes (annotated with —) over time.

Home port	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Alaska	—	—	—	—	—	—	***	***		0		0	—	—	—	—
Seattle	***	***	***	***		0		0		0	***	***	***	***	***	***
Westport	—	—		0		0	***	***		0	***	***	***	***	***	***
Willapa Bay	—	—	***	***		0		0	—	—	—	—	***	***	—	—
Astoria	45.3 [†]	3	56.8 [†]	4	60.2 [†]	6	80.7 [†]	3	69.8 [†]	4	84.3 [†]	3	98.1 [†]	8	68.7 [†]	7
Tillamook or Garibaldi	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***
Newport	11.0 [†]	3	***	***	41.5 [†]	6	67.4 [†]	5	65.8 [†]	5	92.4 [†]	5	78.2 [†]	6	94.5 [†]	4
Charleston or Coos Bay	34.5 [†]	11	38.4 [†]	12	41.7 [†]	11	46.2 [†]	10	44.0 [†]	12	45.6 [†]	14	52.9 [†]	12	55.4 [†]	10
Bandon	***	***	***	***	***	***	***	***	***	***	—	—	***	***		0
Brookings	***	***	31.2 [†]	4	52.5 [†]	4	34.4 [†]	5	49.8 [†]	5	50.2 [†]	6	77.3 [†]	7	46.5 [†]	6
Crescent City	29.8 [†]	4	49.8 [†]	4	42.3 [†]	6	40.2 [†]	6	39.6 [†]	5	39.2 [†]	5	67.0 [†]	4	34.2 [†]	4
Eureka	28.5 [†]	4	26.5 [†]	4	28.5 [†]	4	35.5 [†]	4	18.5 [†]	4	47.8 [†]	4	55.3 [†]	3	***	***
Fort Bragg	—	—	—	—	—	—		0		0		0	***	***		0

Table 4.9: Crab fishery days at sea by home port. Average number of days vessels participated in the Crab fishery on the West Coast by home port reported on the EDC form (N = number of EDC vessels with non-zero, non-NA responses). See description on page 60 for an explanation of EDC form changes (annotated with —) over time.

Home port	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Alaska	—	—	—	—	—	—	***	***		0	***	***	—	—	—	—
Blaine	—	—	—	—	—	—	—	—	—	—	—	—	***	***	—	—
Bellingham Bay	***	***	***	***	***	***	***	***		0	***	***	—	—	—	—
Seattle	***	***	***	***		0		0		0		0		0	***	***
Tacoma	—	—	—	—	—	—		0	***	***	***	***		0	***	***
Westport	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***
Willapa Bay	—	—	***	***	***	***	***	***	—	—	—	—	—	—	—	—
Ilwaco or Chinook	***	***	***	***	***	***	***	***	***	***	***	***	—	—	—	—
Astoria	59.3 [†]	6	52.0 [†]	5	43.0 [†]	8	50.3 [†]	9	40.7 [†]	10	36.1 [†]	10	23.8 [†]	12	38.7 [†]	12
Tillamook or Garibaldi	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***
Newport	30.3 [†]	10	28.1 [†]	10	39.2 [†]	10	23.1 [†]	10	33.1 [†]	10	30.4 [†]	9	26.5 [†]	8	36.3 [†]	9
Winchester Bay	—	—	—	—	—	—	—	—	—	—	—	—	***	***	***	***
Charleston or Coos Bay	34.4 [†]	9	36.1 [†]	8	32.8 [†]	10	33.5 [†]	11	32.7 [†]	12	42.0 [†]	12	27.8 [†]	11	35.8 [†]	10
Bandon	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***
Brookings	25.4 [†]	5	14.0 [†]	5	14.3 [†]	6	14.6 [†]	5	18.8 [†]	6	***	***	***	***	14.8 [†]	4
Crescent City	49.2 [†]	4	33.8 [†]	6	34.3 [†]	7	34.0 [†]	5	42.8 [†]	5	33.2 [†]	5	30.2 [†]	4	41.0 [†]	4
Eureka	63.6 [†]	7	63.6 [†]	7	59.5 [†]	6	37.5 [†]	6	43.2 [†]	6	55.4 [†]	7	24.5 [†]	4	34.0 [†]	5
Fort Bragg	27.0 [†]	3	36.5 [†]	4	49.0 [†]	4	53.8 [†]	4	40.5 [†]	4	43.5 [†]	4	44.5 [†]	4	46.0 [†]	4
San Francisco	—	—	—	—		0		0	***	***	***	***	***	***	***	***
Princeton or Half Moon Bay	25.7 [†]	3	37.5 [†]	4	42.5 [†]	4	34.3 [†]	3	36.7 [†]	3	33.7 [†]	3	9.3 [†]	3	***	***
Santa Cruz	***	***	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Monterey	—	—	—	—	—	—	—	—	***	***	***	***	—	—	***	***
San Luis Obispo	—	—	—	—	***	***	***	***	***	***	—	—	—	—	—	—
Morro Bay	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***

Table 4.10: Halibut fishery days at sea by home port. Average number of days vessels participated in the Halibut fishery on the West Coast by home port reported on the EDC form (N = number of EDC vessels with non-zero, non-NA responses). See description on page 60 for an explanation of EDC form changes (annotated with —) over time.

Home port	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Seattle		0		0		0		0	***	***	—	—	—	—	—	—
Astoria		0		0		0	***	***		0	—	—	—	—	—	—
Newport	***	***	***	***	***	***	***	***	***	***	—	—	—	—	—	—
Charleston or Coos Bay		0		0	***	***		0		0	—	—	—	—	—	—
San Francisco	***	***	***	***	***	***	***	***	***	***	—	—	—	—	—	—
Princeton or Half Moon Bay	***	***	***	***	***	***	***	***	***	***	—	—	—	—	—	—
Monterey	***	***	***	***	—	—	—	—		0	—	—	—	—	—	—

Table 4.11: Pacific halibut fishery days at sea by home port. Average number of days vessels participated in the Pacific halibut fishery on the West Coast by home port reported on the EDC form (N = number of EDC vessels with non-zero, non-NA responses). See description on page 60 for an explanation of EDC form changes (annotated with —) over time.

Home port	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Seattle	—	—	—	—	—	—	—	—	—	—	0	***	***		0	
Newport	—	—	—	—	—	—	—	—	—	—	0	***	***		0	
Winchester Bay	—	—	—	—	—	—	—	—	—	—	—	—	***	***	***	***
Charleston or Coos Bay	—	—	—	—	—	—	—	—	—	—	0	***	***	***	***	***

Table 4.12: California halibut fishery days at sea by home port. Average number of days vessels participated in the California halibut fishery on the West Coast by home port reported on the EDC form (N = number of EDC vessels with non-zero, non-NA responses). See description on page 60 for an explanation of EDC form changes (annotated with —) over time.

Home port	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Newport	—	—	—	—	—	—	—	—	—	—	***	***	***	***	***	***
Eureka	—	—	—	—	—	—	—	—	—	—		0		0		0
San Francisco	—	—	—	—	—	—	—	—	—	—	***	***		0		0
Princeton or Half Moon Bay	—	—	—	—	—	—	—	—	—	—	***	***	***	***	***	***
Monterey	—	—	—	—	—	—	—	—	—	—		0	—	—		0
Morro Bay	—	—	—	—	—	—	—	—	—	—		0		0	—	—

Table 4.13: Salmon fishery days at sea by home port. Average number of days vessels participated in the Salmon fishery on the West Coast by home port reported on the EDC form (N = number of EDC vessels with non-zero, non-NA responses). See description on page 60 for an explanation of EDC form changes (annotated with —) over time.

Home port	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Astoria	0		0	***	***		0		0		0		0		0	
Charleston or Coos Bay	0	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***
Bandon	0		0	—	—		0	—	—	***	***		0		0	
Brookings	0		0		0		0		0	***	***		0		0	
Eureka	0		0	—	—		0		0	***	***		0		0	
Fort Bragg	—	—	***	***	***	***	36.7	3	***	***	***	***	***	***	***	***
Princeton or Half Moon Bay	0		0	***	***	***	***	***	***	***	***	***		0		0
Monterey	—	—	—	—	—	—	—	—	***	***	***	***	—	—		0
San Luis Obispo	—	—	—	—	***	***	***	***	—	—	—	—	—	—	—	—
Morro Bay	0		0		0	23.7	3	***	***	***	***	***	***	***	—	—

Table 4.14: Tuna fishery days at sea by home port. Average number of days vessels participated in the Tuna fishery on the West Coast by home port reported on the EDC form (N = number of EDC vessels with non-zero, non-NA responses). See description on page 60 for an explanation of EDC form changes (annotated with —) over time.

Home port	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Everett	—	—	—	—	—	—	—	—	—	—	—	—	—	—	***	***
Seattle		0		0		0		0		0		0	***	***		0
Westport	—	—	***	***		0		0		0		0		0		0
Astoria	***	***	***	***	***	***	***	***		0		0	***	***		0
Tillamook or Garibaldi		0	***	***	—	—	***	***		0	***	***	***	***	—	—
Newport	***	***	***	***		0	***	***	***	***	***	***	***	***	***	***
Winchester Bay	—	—	—	—	—	—	—	—	—	—	—	—	***	***	***	***
Charleston or Coos Bay	***	***	***	***	***	***	5.3 [*]	3	***	***	4.7 [*]	3	***	***	***	***
Bandon	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***
Brookings		0		0	***	***	***	***		0	***	***		0		0
Crescent City		0		0		0		0	***	***		0		0		0
Eureka	***	***	***	***	—	—		0		0		0		0		0
Fort Bragg	***	***	***	***	—	—	***	***		0		0		0	***	***
Monterey	—	—	—	—	—	—	—	—	***	***	***	***	—	—		0

Table 4.15: Fishing in Alaska or other fisheries fishery days at sea by home port. Average number of days vessels participated in Alaska or other West Coast fisheries by home port reported on the EDC form (N = number of EDC vessels with non-zero, non-NA responses). See description on page 60 for an explanation of EDC form changes (annotated with —) over time.

Home port	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Alaska	***	***	***	***	—	—	—	—	—	—	—	—	—	—	—	—
Bellingham Bay	***	***	***	***	—	—	—	—	—	—	—	—	—	—	—	—
Seattle	114.0 [*]	8	137.8 [*]	8	—	—	—	—	—	—	—	—	—	—	—	—
Astoria	***	***	***	***	—	—	—	—	—	—	—	—	—	—	—	—
Tillamook or Garibaldi	***	***	***	***	—	—	—	—	—	—	—	—	—	—	—	—
Newport	91.9 [*]	12	105.2 [*]	12	—	—	—	—	—	—	—	—	—	—	—	—
Charleston or Coos Bay	***	***	***	***	—	—	—	—	—	—	—	—	—	—	—	—
Brookings	***	***	***	***	—	—	—	—	—	—	—	—	—	—	—	—
San Francisco	***	***	***	***	—	—	—	—	—	—	—	—	—	—	—	—
Morro Bay	***	***	***	***	—	—	—	—	—	—	—	—	—	—	—	—

Table 4.16: Other West Coast Fisheries days at sea by home port. Average number of days vessels participated in Other West Coast fisheries by home port reported on the EDC form (N = number of EDC vessels with non-zero, non-NA responses). See description on page 60 for an explanation of EDC form changes (annotated with —) over time.

Home port	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Tillamook or Garibaldi	—	—	—	—	—	—	0		0		0		0		—	—
Crescent City	—	—	—	—	0		0	***	***		0		0		0	
Monterey	—	—	—	—	—	—	—	—	***	***	***	***	—	—	—	—
San Luis Obispo	—	—	—	—	0	***	***	***	***		—	—	—	—	—	—
Morro Bay	—	—	—	—	***	***	***	***	28.0 [‡]	3	0		0		—	—

Table 4.17: Chartering or research days at sea by home port. Average number of days vessels participated in chartering or research by home port reported on the EDC form (N = number of EDC vessels with non-zero, non-NA responses). See description on page 60 for an explanation of EDC form changes (annotated with —) over time.

Home port	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Alaska	—	—	—	—	***	***	—	—	—	—	—	—	—	—	—	—
Bellingham Bay		0		0	***	***	—	—	—	—	—	—	—	—	—	—
Seattle		0	***	***	***	***	—	—	—	—	—	—	—	—	—	—
Astoria	***	***	***	***	***	***	—	—	—	—	—	—	—	—	—	—
Tillamook or Garibaldi		0	***	***	—	—	—	—	—	—	—	—	—	—	—	—
Newport	35.5 [‡]	4	36.0 [‡]	4	48.8 [‡]	4	—	—	—	—	—	—	—	—	—	—
Charleston or Coos Bay	21.2 [‡]	4	***	***	***	***	—	—	—	—	—	—	—	—	—	—
Brookings	***	***	***	***	***	***	—	—	—	—	—	—	—	—	—	—
Fort Bragg	—	—	—	—	***	***	—	—	—	—	—	—	—	—	—	—

Table 4.18: Fishing in Alaska fishery days at sea by home port. Average number of days vessels participated in the Fishing in Alaska fishery by home port reported on the EDC form (N = number of EDC vessels with non-zero, non-NA responses). See description on page 60 for an explanation of EDC form changes (annotated with —) over time.

Home port	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Alaska	—	—	—	—	***	***	—	—	***	***	***	***	***	***	***	***
Bellingham Bay	—	—	—	—	***	***	***	***	***	***		0	—	—	—	—
Seattle	—	—	—	—	124.6 [†]	9	122.0 [†]	6	128.3 [†]	6	126.0 [†]	8	110.4 [†]	7	98.2 [†]	8
Tacoma	—	—	—	—	—	—	***	***	***	***	***	***	***	***	***	***
Astoria	—	—	—	—	***	***	***	***		0		0		0		0
Tillamook or Garibaldi	—	—	—	—	***	***		0		0		0		0	—	—
Newport	—	—	—	—	105.2 [†]	11	90.8 [†]	11	109.3 [†]	12	111.8 [†]	12	107.4 [†]	11	107.6 [†]	12
Charleston or Coos Bay	—	—	—	—	***	***	***	***		0		0		0		0
Brookings	—	—	—	—	***	***	***	***	***	***	***	***	***	***	***	***
San Francisco	—	—	—	—	***	***	***	***		0		0		0		0

Table 4.19: Chartering, research, or tendering on the West Coast fishery days at sea by home port. Average number of days vessels participated in chartering, research, or tendering on the west coast fishery on the West Coast by home port reported on the EDC form (N = number of EDC vessels with non-zero, non-NA responses). See description on page 60 for an explanation of EDC form changes (annotated with —) over time.

Home port	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Westport	—	—	—	—	—	—	0	***	***	—	0	—	0	—	0	—
Willapa Bay	—	—	—	—	—	—	—	—	—	—	—	—	***	***	—	—
Astoria	—	—	—	—	—	—	***	***	—	0	***	***	***	***	***	***
Tillamook or Garibaldi	—	—	—	—	—	—	***	***	—	0	—	0	—	0	—	—
Newport	—	—	—	—	—	—	29.3 [†]	3	32.2 [†]	4	15.0 [†]	3	39.2 [†]	4	38.2 [†]	4
Winchester Bay	—	—	—	—	—	—	—	—	—	—	—	—	—	0	***	***
Charleston or Coos Bay	—	—	—	—	—	—	—	0	—	0	***	***	***	***	***	***
Brookings	—	—	—	—	—	—	***	***	***	***	***	***	***	***	***	***
Princeton or Half Moon Bay	—	—	—	—	—	—	—	0	***	***	***	***	—	0	—	0
Moss Landing	—	—	—	—	—	—	***	***	—	—	—	—	—	—	—	—
Monterey	—	—	—	—	—	—	—	—	—	0	—	0	—	—	—	0
Morro Bay	—	—	—	—	—	—	—	0	***	***	***	***	***	***	—	—

Table 4.20: Chartering, research, or tendering in Alaska fishery days at sea by home port. Average number of days vessels participated in chartering, research, or tendering in Alaska by home port reported on the EDC form (N = number of EDC vessels with non-zero, non-NA responses). See description on page 60 for an explanation of EDC form changes (annotated with —) over time.

Home port	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Alaska	—	—	—	—	—	—	—	—		0		0	—	—	—	—
Seattle	—	—	—	—	—	—	***	***	***	***	***	***	***	***	***	***
Astoria	—	—	—	—	—	—	43.3 [*]	3	***	***	82.7 [*]	3	63.0 [*]	3	65.6 [*]	5
Newport	—	—	—	—	—	—		0	***	***	***	***	***	***	***	***

Table 4.21: Steaming between West Coast and Alaska fishery days at sea by home port. Average number of days vessels steamed between the West Coast and Alaska by home port reported on the EDC form (N = number of EDC vessels with non-zero, non-NA responses). See description on page 60 for an explanation of EDC form changes (annotated with —) over time.

Home port	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Alaska	***	***	***	***	***	***	—	—	***	***	***	***	***	***	***	***
Bellingham Bay	***	***	***	***	***	***	***	***	***	***		0	—	—	—	—
Seattle	19.8 [*]	8	17.9 [*]	9	15.6 [*]	9	14.3 [*]	6	15.0 [*]	6	14.6 [*]	8	21.1 [*]	7	21.1 [*]	8
Tacoma	—	—	—	—	—	—	***	***	***	***	***	***	***	***	***	***
Astoria	***	***	16.0 [*]	3	***	***	16.8 [*]	4	***	***	18.7 [*]	3	19.3 [*]	3	15.0 [*]	3
Tillamook or Garibaldi	***	***	***	***	***	***		0		0		0		0	—	—
Newport	20.3 [*]	12	22.6 [*]	12	20.1 [*]	11	20.0 [*]	11	16.8 [*]	13	18.5 [*]	13	17.8 [*]	12	20.2 [*]	13
Charleston or Coos Bay	***	***	***	***	***	***	***	***		0		0		0		0
Brookings	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***
San Francisco	***	***	***	***	***	***	***	***		0		0		0		0

5 Vessel Physical Characteristics

5.1 Average market value, replacement value, vessel length, fuel capacity, and horsepower of main engines

Survey participants are asked to provide basic information about the vessel and its physical characteristics, including market value, replacement value, vessel length, horsepower of main engines, and fuel capacity from the most recent marine survey (Table 5.1 and Figures 37, 38, 39, and 40). Marine surveys are done on a regular basis and are often required for insurance, financing, and other purposes.

The market value is the marine surveyor's estimate of what the vessel could be sold for in its current condition, and the replacement value is the estimate of what it would cost to replace the current vessel with a new vessel.

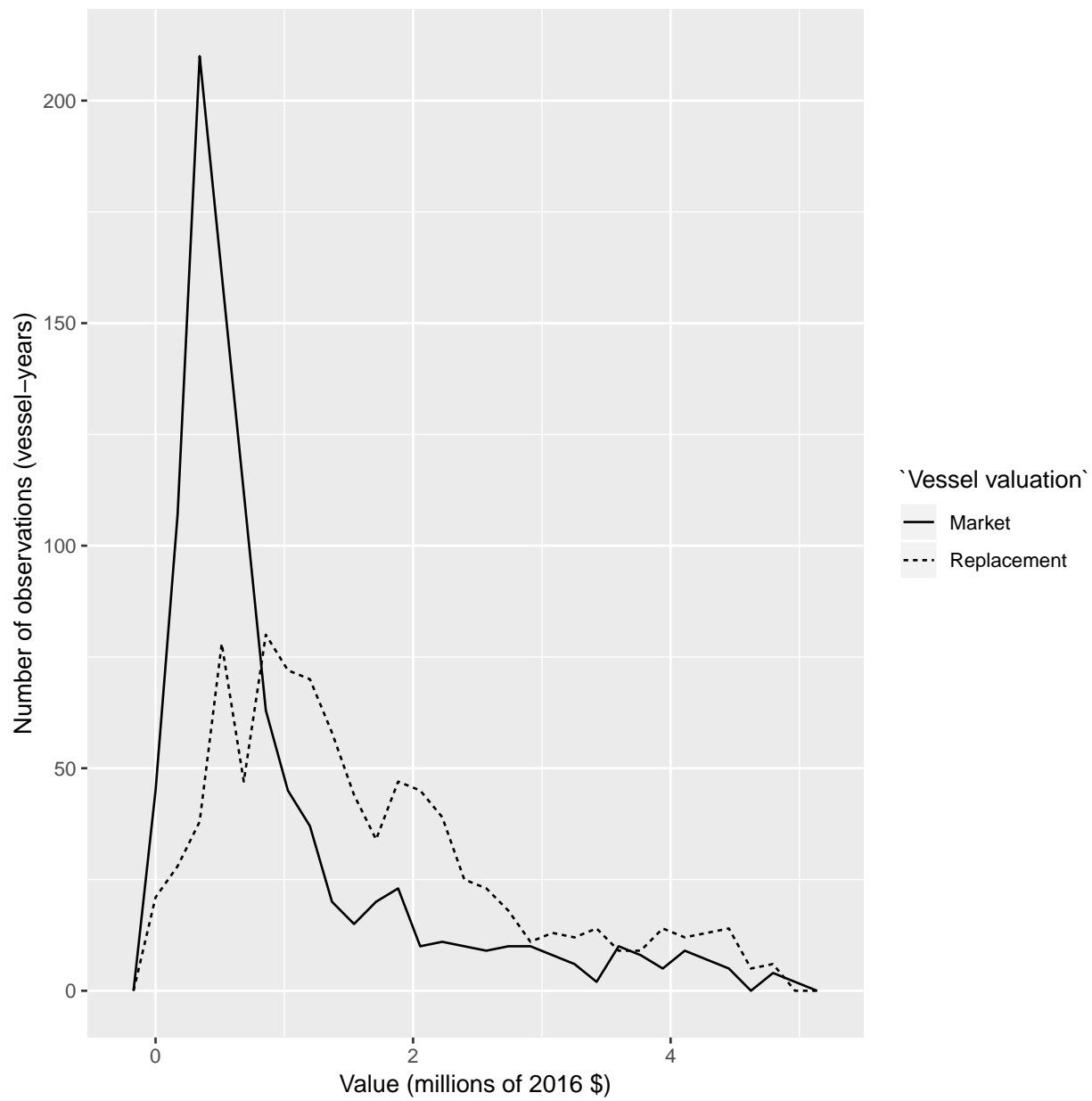


Figure 37: Market value and replacement value (millions of dollars) of all vessels that completed a survey. Vessel values greater than \$5 million.

Table 5.1: Average vessel characteristics. Average market value (\$ millions), replacement value (\$ millions), length (feet), fuel capacity (thousand gallons), and horsepower of main engines (N = number of EDC vessels with non-zero, non-NA responses).

Characteristic	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Market value	1.1 [‡]	123	1.1 [‡]	121	1.2 [‡]	138	1.1 [‡]	135	1.2 [‡]	132	1.3 [‡]	132	1.4 [‡]	124	1.5 [‡]	120
Replacement value	2.0 [‡]	121	2.0 [‡]	120	2.2 [‡]	135	2.2 [‡]	131	2.4 [‡]	127	2.6 [‡]	129	2.7 [‡]	123	3.8 [‡]	119
Vessel length	72.8 [*]	140	72.6 [*]	143	72.2 [*]	153	68.5 [*]	149	68.6 [*]	144	69.9 [*]	143	70.9 [*]	135	70.2 [*]	130
Vessel fuel capacity	12.4 [‡]	139	12.2 [‡]	142	12.1 [‡]	154	11.4 [‡]	143	11.3 [‡]	141	11.6 [‡]	140	12.1 [‡]	131	12.3 [‡]	127
Horsepower	650.1 [‡]	140	635.8 [‡]	143	634.4 [‡]	151	624.0 [‡]	143	630.7 [‡]	137	666.1 [‡]	138	663.4 [‡]	131	673.4 [‡]	126

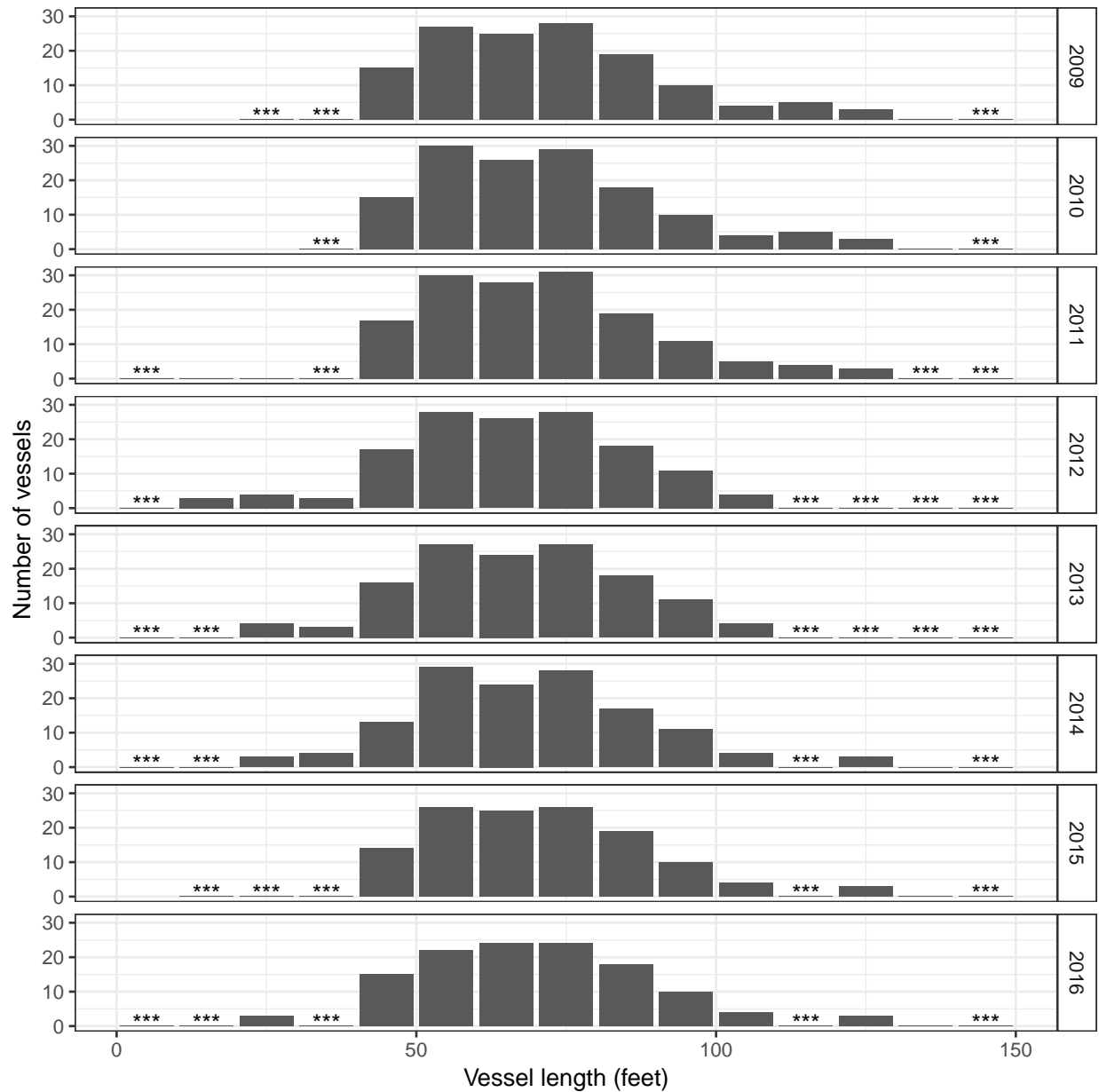


Figure 38: Vessel length (feet) of all vessels that completed a survey. *** indicate that values were suppressed for confidentiality reasons.

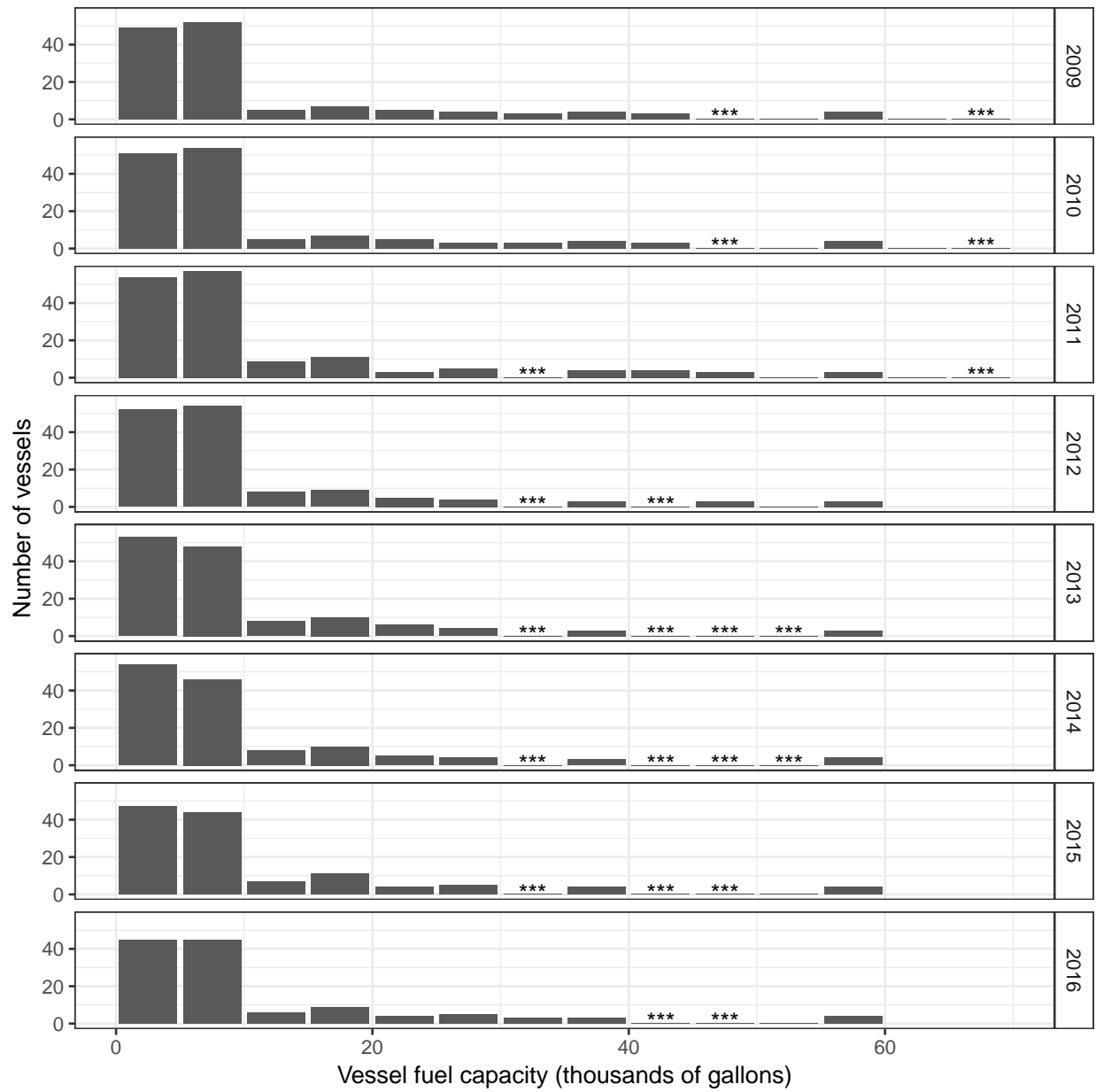


Figure 39: Vessel fuel capacity (thousands of gallons) of all vessels that completed a survey. *** indicate that values were suppressed for confidentiality reasons.

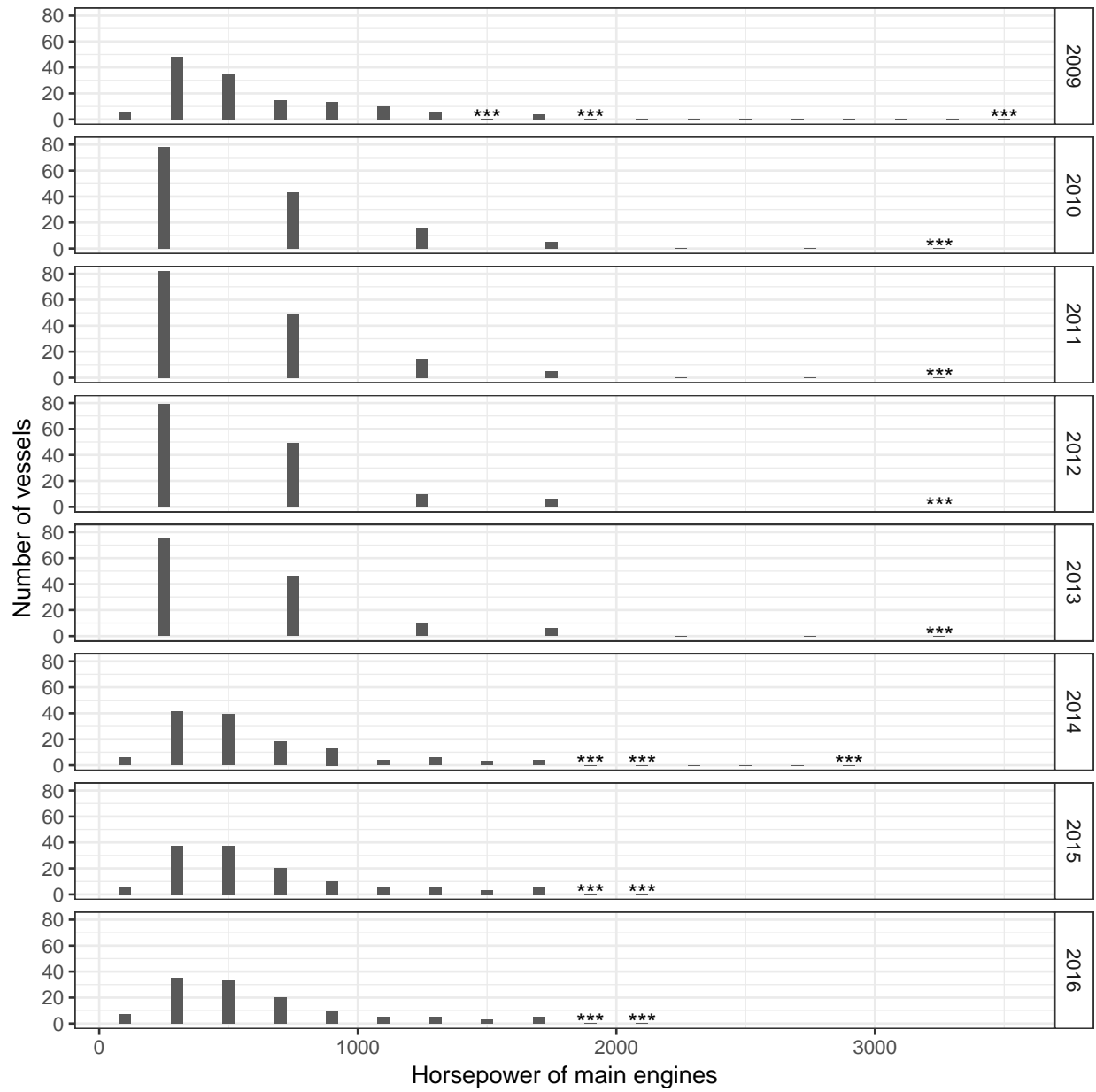


Figure 40: Horsepower of main engines of all vessels that completed a survey. *** indicate that values were suppressed for confidentiality reasons.

Participants provide information about whether the vessel was hauled out (vessel was removed from the water for maintenance and repairs). Each year, a significant portion of all active fishing vessels are hauled out. The information shown below in Table 5.2 provides context that may be used to explain major costs associated with vessel repair and maintenance.

Participants also note whether they process fish at-sea, which has increased over time (Table 5.3). The most common occurrence of at-sea processing is heading and gutting sablefish before delivering the fish.

Table 5.2: Haul outs. Number (N) and percentage (%) of EDC vessels that hauled the vessel during the year.

Haul out	2009		2010		2011		2012		2013		2014		2015		2016	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Yes	84	64%	66	51%	86	62%	84	64%	62	50%	81	63%	73	61%	62	54%
No	48	36%	63	49%	53	38%	48	36%	63	50%	47	37%	47	39%	52	46%

Table 5.3: Catcher vessels that processed at-sea. Number (N) and percentage (%) of EDC vessels that processed or headed and gutted fish on-board the vessel in survey year.

Processed at-sea	2009		2010		2011		2012		2013		2014		2015		2016	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Yes	6	4.5%	7	5.4%	15	10.8%	17	12.9%	14	11.3%	13	10.1%	15	12.4%	15	13.2%
No	126	95.5%	122	94.6%	121	87.1%	115	87.1%	107	86.3%	113	87.6%	89	73.6%	96	84.2%
No response	0	0.0%	0	0.0%	3	2.2%	0	0.0%	3	2.4%	3	2.3%	17	14.0%	3	2.6%

5.2 Vessel characteristics by whether the vessel fished on the West Coast and in Alaska, only fished on the West Coast, only fished in Alaska, or did not fish

The physical characteristics of vessels can vary depending on fishery participation and where the vessel operates. Vessel characteristics have been delineated based on whether vessels fished on the West Coast, Alaska, both, or did not fish at all in a given year (Tables 5.4 through 5.8).

Table 5.4: Average horsepower. Average horsepower (thousands) of EDC vessels that fished only on the West Coast (WC only), only in Alaska (AK only), both on the West Coast and in Alaska (WC and AK), or did not fish (N = number of entities with non-zero, non-NA responses).

Activity	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
WC only	0 ⁺	108	0 ⁺	107	0 ⁺	112	0 ⁺	107	0 ⁺	100	0 ⁺	100	1 ⁺	104	1 ⁺	94
AK only	1 ⁺	3	***	***	1 ⁺	6	1 ⁺	6	1 ⁺	5	1 ⁺	6	1 ⁺	4	1 ⁺	3
WC and AK	1 ⁺	32	1 ⁺	32	1 ⁺	34	1 ⁺	26	1 ⁺	25	1 ⁺	24	1 ⁺	22	1 ⁺	23
Did not fish	1 ⁺	7	1 ⁺	9	1 ⁺	9	1 ⁺	8	0 ⁺	14	1 ⁺	14	1 ⁺	11	0 ⁺	11

Table 5.5: Average replacement value. Average replacement value (millions of \$) of EDC vessels that fished only on the West Coast (WC only), only in Alaska (AK only), both on the West Coast and in Alaska (WC and AK), or did not fish (N = number of entities with non-zero, non-NA responses). In 2009 and 2010, there was no question specifically for Alaska and if the vessel did not fish in 2009 and 2010, the owner was not required to provide the market value of the vessel.

Activity	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
WC only	\$1.0 ⁺	91	\$1.0 ⁺	90	\$1.3 ⁺	97	\$1.4 ⁺	95	\$1.5 ⁺	94	\$1.7 ⁺	93	\$2.1 ⁺	99	\$2.4 ⁺	90
AK only	\$6.1 ⁺	3	***	***	\$6.2 ⁺	6	\$3.5 ⁺	6	\$2.4 ⁺	5	\$8.0 ⁺	6	\$3.2 ⁺	4	\$3.7 ⁺	3
WC and AK	\$4.5 ⁺	29	\$5.0 ⁺	30	\$4.5 ⁺	32	\$5.3 ⁺	26	\$6.2 ⁺	26	\$5.9 ⁺	25	\$6.0 ⁺	22	\$10.2 ⁺	22
Did not fish		0		0	\$2.1 ⁺	8	\$0.4 ⁺	6	\$0.2 ⁺	7	\$0.5 ⁺	8	\$1.9 ⁺	7	\$0.7 ⁺	7

Table 5.6: Average market value. Average market value (millions of \$) of EDC vessels that fished only on the West Coast (WC only), only in Alaska (AK only), both on the West Coast and in Alaska (WC and AK), or did not fish (N = number of entities with non-zero, non-NA responses). In 2009 and 2010, if the vessel did not fish in 2009 and 2010, the owner was not required to provide the replacement value of the vessel.

Activity	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
WC only	\$0.4 [†]	93	\$0.4 [†]	91	\$0.5 [†]	98	\$0.6 [†]	98	\$0.6 [†]	96	\$0.7 [†]	94	\$1.0 [†]	99	\$1.0 [†]	89
AK only	\$4.2 [†]	3	***	***	\$3.9 [†]	6	\$1.9 [†]	6	\$1.5 [†]	5	\$4.6 [†]	6	\$1.9 [†]	4	\$2.3 [†]	3
WC and AK	\$2.8 [†]	29	\$3.3 [†]	30	\$2.9 [†]	33	\$3.1 [†]	26	\$3.7 [†]	26	\$3.4 [†]	25	\$3.4 [†]	22	\$3.7 [†]	22
Did not fish		0		0	\$0.7 [†]	9	\$0.1 [†]	7	\$0.2 [†]	10	\$0.2 [†]	10	\$1.2 [†]	8	\$0.3 [†]	8

Table 5.7: Average vessel fuel capacity. Average vessel fuel capacity (thousands of gallons) of EDC vessels that fished only on the West Coast (WC only), only in Alaska (AK only), both on the West Coast and in Alaska (WC and AK), or did not fish (N = number of entities with non-zero, non-NA responses).

Activity	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
WC only	6.6 [†]	108	6.7 [†]	107	7.1 [†]	112	7.4 [†]	107	8.1 [†]	102	8.0 [†]	101	8.7 [†]	105	8.4 [†]	95
AK only	29.8 [†]	3	***	***	33.5 [†]	6	18.5 [†]	6	15.0 [†]	5	22.2 [†]	6	21.5 [†]	4	17.3 [†]	3
WC and AK	28.7 [†]	32	31.2 [†]	32	24.3 [†]	34	27.4 [†]	26	29.1 [†]	26	29.6 [†]	25	28.3 [†]	22	29.6 [†]	23
Did not fish	26.4 [†]	6	14.1 [†]	8	18.3 [†]	9	10.0 [†]	8	4.1 [†]	15	4.7 [†]	14	9.1 [†]	11	6.5 [†]	11

Table 5.8: Average vessel length. Average length (feet) of EDC vessels that fished only on the West Coast (WC only), only in Alaska (AK only), both on the West Coast and in Alaska (WC and AK), or did not fish (N = number of entities with non-zero, non-NA responses).

Activity	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
WC only	65 [†]	108	65 [†]	107	65 [†]	112	65 [†]	107	66 [†]	103	67 [†]	101	67 [†]	107	67 [†]	96
AK only	98 [†]	3	***	***	98 [†]	6	93 [†]	6	90 [†]	4	102 [†]	5	95 [†]	4	89 [†]	3
WC and AK	98 [†]	32	100 [†]	32	93 [†]	34	95 [†]	26	96 [†]	26	95 [†]	25	93 [†]	22	95 [†]	23
Did not fish	81 [†]	7	71 [†]	9	70 [†]	12	41 [†]	14	42 [†]	17	45 [†]	17	54 [†]	14	45 [†]	14

6 Vessel Fuel Use, Speed, and Crew Size

6.1 Fuel use

Participants provide information about fuel use, which can be delineated according to fishery participation and vessel size. There have been two changes to this question since the implementation of the survey. Through 2013, participants were asked to report their average fuel use per day for all fishing for groundfish with fixed gear; starting in 2014, participants were asked to provide average fuel use separately for fixed gear with a trawl permit and fixed gear with a fixed gear permit. Similarly, in 2014, participants reported fuel use for Pacific halibut separately from California halibut. Similarly, as a result of changes in fishing behavior, a new question was added in 2015, requesting fuel use for the Non-whiting midwater fishery. More information about these changes can be found on page 60.

Average fuel use per day by fishery

Table 6.1: Daily fuel use. Average daily fuel use (gallons per day) by fishery. See above for explanation of changes to the data collection across years (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Activity	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Pacific whiting	791 [†]	39	822 [†]	41	823 [†]	34	814 [†]	30	781 [†]	32	741 [†]	31	792 [†]	29	778 [†]	28
Groundfish with midwater trawl gear	—	—	—	—	—	—	—	—	—	—	—	—	574 [†]	17	479 [†]	13
Groundfish with trawl gear	311 [†]	106	304 [†]	99	326 [†]	81	321 [†]	73	327 [†]	75	327 [†]	70	308 [†]	64	314 [†]	59
Groundfish with fixed gear	156 [†]	8	143 [†]	9	159 [†]	27	168 [†]	24	164 [†]	21	—	—	—	—	—	—
Groundfish fixed gear with a trawl permit	—	—	—	—	—	—	—	—	—	—	154 [†]	20	175 [†]	18	170 [†]	18
Groundfish fixed gear with a fixed gear permit	—	—	—	—	—	—	—	—	—	—	197 [†]	9	167 [†]	11	179 [†]	9
Crab	174 [†]	56	178 [†]	56	170 [†]	66	185 [†]	65	197 [†]	65	187 [†]	64	190 [†]	57	205 [†]	57
Halibut	271 [†]	7	206 [†]	6	141 [†]	7	203 [†]	6	212 [†]	5	—	—	—	—	—	—
Pacific halibut	—	—	—	—	—	—	—	—	—	—	***	***	132 [†]	4	***	***
California halibut	—	—	—	—	—	—	—	—	—	—	235 [†]	4	149 [†]	3	144 [†]	3
Salmon	***	***	39 [†]	4	70 [†]	5	45 [†]	10	42 [†]	6	48 [†]	9	48 [†]	3	***	***
Shrimp	241 [†]	36	229 [†]	36	223 [†]	43	242 [†]	41	258 [†]	39	244 [†]	43	247 [†]	48	270 [†]	41
Tuna	129 [†]	15	120 [†]	14	78 [†]	8	102 [†]	12	100 [†]	8	73 [†]	8	112 [†]	9	106 [†]	9
Steaming between West Coast and Alaska	896 [†]	31	853 [†]	33	810 [†]	32	814 [†]	31	757 [†]	28	781 [†]	29	787 [†]	25	774 [†]	26

Average fuel use per day by fishery and vessel length class

Table 6.2: Pacific whiting fishery fuel use. Average fuel use (gallons per day) of vessels that fished in the Pacific whiting fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels ≤ 80 ft, and small vessels ≤ 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Small vessel		0		0	***	***		0		0		0		0		0
Medium vessel	399	9	407	9	396	5	481	5	487	5	487	5	598	4	531	3
Large vessel	908	30	939	32	920	28	880	25	835	27	790	26	823	25	807	25

Table 6.3: Groundfish with midwater trawl gear fishery fuel use. Average fuel use (gallons per day) of vessels that fished in the Groundfish with midwater trawl gear fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels ≤ 80 ft, and small vessels ≤ 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Small vessel	—	—	—	—	—	—	—	—	—	—	—	—	***	***	***	***
Medium vessel	—	—	—	—	—	—	—	—	—	—	—	—	472	6	427	5
Large vessel	—	—	—	—	—	—	—	—	—	—	—	—	678	10	564	7

Table 6.4: Groundfish with trawl gear fishery fuel use. Average fuel use (gallons per day) of vessels that fished in the Groundfish with trawl gear fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels ≤ 80 ft, and small vessels ≤ 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Small vessel	182	36	189	30	241	20	220	19	230	18	223	18	202	16	212	13
Medium vessel	288	48	289	49	286	45	304	42	303	44	305	39	310	38	319	37
Large vessel	571	22	516	20	543	16	541	12	543	13	535	13	470	10	445	9

Table 6.5: Groundfish with fixed gear fishery fuel use. Average fuel use (gallons per day) of vessels that fished in the Groundfish with fixed gear fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels <= 80 ft, and small vessels <= 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Small vessel	91	6	84	7	116	18	102	14	129	14	—	—	—	—	—	—
Medium vessel	***	***	***	***	200	7	231	8	235	7	—	—	—	—	—	—
Large vessel	***	***	***	***	***	***	***	***	—	—	—	—	—	—	—	—

Table 6.6: Groundfish fixed gear with a trawl permit fishery fuel use. Average fuel use (gallons per day) of vessels that fished in the Groundfish fixed gear with a trawl permit fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels <= 80 ft, and small vessels <= 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Small vessel	—	—	—	—	—	—	—	—	—	—	101	13	128	11	137	10
Medium vessel	—	—	—	—	—	—	—	—	—	—	252	7	247	6	207	7
Large vessel	—	—	—	—	—	—	—	—	—	—	—	—	***	***	***	***

Table 6.7: Groundfish fixed gear with a fixed gear permit fishery fuel use. Average fuel use (gallons per day) of vessels that fished in the Groundfish fixed gear with a fixed gear permit fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels <= 80 ft, and small vessels <= 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Small vessel	—	—	—	—	—	—	—	—	—	—	114	4	112	6	114	4
Medium vessel	—	—	—	—	—	—	—	—	—	—	264	5	230	4	227	4
Large vessel	—	—	—	—	—	—	—	—	—	—	—	—	***	***	***	***

Table 6.8: Crab fishery fuel use. Average fuel use (gallons per day) of vessels that fished in the Crab fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels <= 80 ft, and small vessels <= 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Small vessel	99	30	99	29	99	33	97	31	101	30	98	32	104	28	103	24
Medium vessel	235	20	239	21	224	26	250	27	262	26	254	25	252	22	259	25
Large vessel	342	6	350	6	303	7	324	7	330	9	350	7	343	7	341	8

Table 6.9: Halibut fishery fuel use. Average fuel use (gallons per day) of vessels that fished in the Halibut fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels <= 80 ft, and small vessels <= 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Small vessel	100	4	50	3	54	4	***	***	82	3	—	—	—	—	—	—
Medium vessel	***	***	363	3	258	3	272	4	***	***	—	—	—	—	—	—
Large vessel	***	***	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Table 6.10: Pacific halibut fishery fuel use. Average fuel use (gallons per day) of vessels that fished in the Pacific halibut fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels <= 80 ft, and small vessels <= 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Small vessel	—	—	—	—	—	—	—	—	—	—	—	—	93	3	***	***
Medium vessel	—	—	—	—	—	—	—	—	—	—	***	***	—	—	—	—
Large vessel	—	—	—	—	—	—	—	—	—	—	—	—	***	***	***	***

Table 6.11: California halibut fishery fuel use. Average fuel use (gallons per day) of vessels that fished in the California halibut fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels ≤ 80 ft, and small vessels ≤ 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Small vessel	—	—	—	—	—	—	—	—	—	—	***	***	***	***	***	***
Medium vessel	—	—	—	—	—	—	—	—	—	—	***	***	***	***	***	***

Table 6.12: Salmon fishery fuel use. Average fuel use (gallons per day) of vessels that fished in the Salmon fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels ≤ 80 ft, and small vessels ≤ 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Small vessel	***	***	39	4	70	5	45	10	42	6	48	9	48	3	***	***

Table 6.13: Shrimp fishery fuel use. Average fuel use (gallons per day) of vessels that fished in the Shrimp fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels ≤ 80 ft, and small vessels ≤ 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Small vessel	160	11	153	10	169	13	167	11	177	10	156	12	159	14	180	9
Medium vessel	263	21	239	21	239	25	257	22	278	22	257	23	267	26	278	24
Large vessel	350	4	340	5	285	5	306	8	314	7	338	8	338	8	349	8

Table 6.14: Tuna fishery fuel use. Average fuel use (gallons per day) of vessels that fished in the Tuna fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels ≤ 80 ft, and small vessels ≤ 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Small vessel	98	12	98	12	75	7	79	9	79	6	64	6	92	6	78	5
Medium vessel	251	3	***	***	***	***	168	3	***	***	***	***	***	***	103	3
Large vessel		0		0		0		0		0		0	***	***	***	***

Table 6.15: Steaming between West Coast and Alaska fishery fuel use. Average fuel use (gallons per day) of vessels that steamed between West Coast and Alaska by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels ≤ 80 ft, and small vessels ≤ 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Small vessel		0		0	***	***	***	***	***	***	***	***	***	***	***	***
Medium vessel	488	3	450	4	321	4	327	5	376	4	482	6	419	4	395	5
Large vessel	939	28	908	29	921	26	960	24	870	22	914	21	919	19	926	19

Average total fuel use

Table 6.16: Average total fuel use. Average total fuel use (thousands of gallons) per entity (N = number of EDC vessels with non-zero, non-NA responses). An entity is defined as a unique combination of an owner or lessee and vessel, whereas a vessel refers to all activities related to that vessel, regardless of the number individuals who owned or leased the vessel.

Activity	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Total diesel	24.2 [‡]	129	26.6 [‡]	128	24.8 [‡]	133	26.3 [‡]	130	27.3 [‡]	125	28.7 [‡]	125	27.2 [‡]	118	31.6 [‡]	112
Other	0.3 [‡]	7	0.3 [‡]	6	***	***	0.1 [‡]	4	***	***	0.1 [‡]	4	0.1 [‡]	3	0.3 [‡]	4

6.2 Speed while fishing or steaming

Participants provide the average speed of the vessel while participating in each fishery (Table 6.17). This value is only required for trawl fisheries, and therefore, no speed is provided for halibut, crab, or groundfish with fixed gear. These data are delineated by fishery and vessel length class, as summarized in Tables 6.18 through 6.25. Speed data are not available for all fisheries across all years due to changes in the survey data collection. Starting in 2014, participants began reporting average speed for California halibut, and in 2015 participants began reporting fuel use for the Groundfish with midwater trawl gear fishery separately from Groundfish with trawl gear. More information about these form changes can be found on page 60.

Average speed by fishery

Table 6.17: Average speed. Average speed (knots) by fishery. See above for explanation of changes to the data collection across years (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Fishery	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Pacific whiting	3.1 [*]	39	3.1 [*]	41	3.3 [*]	34	3.1 [*]	30	3.4 [*]	32	3.3 [*]	31	3.3 [*]	29	3.2 [*]	28
Groundfish with midwater trawl gear	—	—	—	—	—	—	—	—	—	—	—	—	2.8 [*]	17	3.0 [*]	13
Groundfish with trawl gear	2.6 [*]	106	2.6 [*]	99	2.8 [*]	80	2.7 [‡]	72	2.9 [‡]	73	2.8 [‡]	69	2.3 [*]	63	2.7 [‡]	59
California halibut	—	—	—	—	—	—	—	—	—	—	2.8 [*]	4	2.8 [*]	3	2.7 [*]	3
Salmon	***	***	2.5 [*]	4	2.5 [*]	5	2.8 [*]	10	2.6 [*]	6	2.6 [*]	9	2.8 [*]	3	***	***
Shrimp	2.0 [*]	36	1.9 [*]	36	2.7 [‡]	42	2.7 [‡]	40	2.1 [*]	38	2.2 [*]	43	2.2 [*]	48	2.0 [*]	41
Tuna	5.0 [*]	15	5.2 [*]	15	5.5 [*]	9	5.3 [*]	12	5.6 [*]	8	6.1 [*]	8	5.4 [*]	9	5.6 [*]	9
Steaming between West Coast and Alaska	9.0 [*]	31	9.0 [*]	32	8.9 [*]	32	8.8 [*]	31	8.7 [*]	28	9.2 [*]	27	8.9 [*]	25	8.7 [*]	26

Average speed by fishery and vessel length class

Table 6.18: Pacific whiting fishery fishing speed. Average speed (knots) of vessels that fished in the Pacific whiting fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels ≤ 80 ft, and small vessels ≤ 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Small vessel		0		0	***	***		0		0		0		0		0
Medium vessel	2.9	9	2.9	9	3.8	5	3.2	5	3.2	5	3.2	5	3.0	4	2.7	3
Large vessel	3.1	30	3.1	32	3.3	28	3.1	25	3.4	27	3.3	26	3.3	25	3.3	25

Table 6.19: Groundfish with midwater trawl gear fishery fishing speed. Average speed (knots) of vessels that fished in the Groundfish with midwater trawl gear fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels ≤ 80 ft, and small vessels ≤ 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Small vessel	—	—	—	—	—	—	—	—	—	—	—	—	***	***	***	***
Medium vessel	—	—	—	—	—	—	—	—	—	—	—	—	2.7	6	3.4	5
Large vessel	—	—	—	—	—	—	—	—	—	—	—	—	2.9	10	2.9	7

Table 6.20: Groundfish with trawl gear fishery fishing speed. Average speed (knots) of vessels that fished in the Groundfish with trawl gear fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels ≤ 80 ft, and small vessels ≤ 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Small vessel	2.8	36	2.9	30	2.6	20	2.1	19	2.1	17	2.2	17	2.2	15	2.5	13
Medium vessel	2.4	48	2.4	49	2.9	44	3.0	41	3.1	44	3.2	39	2.4	38	2.9	37
Large vessel	3.0	22	2.6	20	2.6	16	2.5	12	3.0	13	2.4	13	2.3	10	2.3	9

Table 6.21: California halibut fishery fishing speed. Average speed (knots) of vessels that fished in the California halibut fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels ≤ 80 ft, and small vessels ≤ 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Small vessel	—	—	—	—	—	—	—	—	—	—	***	***	***	***	***	***
Medium vessel	—	—	—	—	—	—	—	—	—	—	***	***	***	***	***	***
Large vessel	—	—	—	—	—	—	—	—	—	—		0	—	—	—	—

Table 6.22: Salmon fishery fishing speed. Average speed (knots) of vessels that fished in the Salmon fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels ≤ 80 ft, and small vessels ≤ 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Small vessel	***	***	2.5	4	2.5	5	2.8	10	2.6	6	2.6	9	2.8	3	***	***
Medium vessel			0		0		0		0		0		0			0
Large vessel			0		0		0		0		0		0			0

Table 6.23: Shrimp fishery fishing speed. Average speed (knots) of vessels that fished in the Shrimp fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels ≤ 80 ft, and small vessels ≤ 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Small vessel	2.3	11	1.9	10	2.2	12	2.3	10	2.4	9	2.7	12	2.6	14	1.9	9
Medium vessel	1.8	21	1.9	21	3.0	25	3.2	22	2.0	22	2.1	23	2.0	26	2.0	24
Large vessel	1.9	4	2.0	5	1.9	5	1.9	8	2.0	7	2.0	8	2.0	8	2.0	8

Table 6.24: Tuna fishery fishing speed. Average speed (knots) of vessels that fished in the Tuna fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels <= 80 ft, and small vessels <= 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Small vessel	4.9	12	5.1	12	5.1	7	5.1	9	5.7	6	6.2	6	5.4	6	5.0	5
Medium vessel	5.7	3	5.7	3	***	***	5.8	3	***	***	***	***	***	***	6.5	3
Large vessel		0		0	***	***		0		0		0	***	***	***	***

Table 6.25: Steaming between West Coast and Alaska fishery fishing speed. Average speed (knots) of vessels that steamed between West Coast and Alaska by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels <= 80 ft, and small vessels <= 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Small vessel		0		0	***	***	***	***	***	***	***	***	***	***	***	***
Medium vessel	9.0	3	8.8	4	8.5	4	8.4	5	8.1	4	8.5	5	7.3	4	7.5	5
Large vessel	9.0	28	9.0	28	9.0	26	8.8	24	8.8	22	9.4	21	9.2	19	8.9	19

6.3 Crew size

Participants submit information about crew size for each fishery in which they participate (Table 6.26). These data provide information about the total number of jobs or positions on vessels; they do not reflect the total number of individuals who worked as crew members in any given year. A new question was added for the 2013 data collection that asks participants to provide the total number of individuals that worked on the vessel during the year (Table 6.41), also delineated by vessel length (Table 6.42). The total number of individuals employed across all vessels serves as an upper bound of the total number of individuals employed in the fishery (Table 6.43).

Crew size data are not available for all fisheries across all years due to changes in fishery participation and the survey data collection. Starting in 2014, participants were asked to provide average crew size for both fixed gear with a trawl permit and fixed gear with a fixed gear permit rather than reporting them as combined. Similarly, starting in 2014, participants report crew size for Pacific halibut separately from California halibut. Crew size is reported by fishery and vessel length class in Tables 6.27 through 6.40. Similarly, as a result of changes in fishing behavior, a new question was added in 2015, requesting crew size for the Non-whiting midwater fishery. More information about these form changes can be found on page 60.

Average crew size by fishery

Table 6.26: Average crew size. Average crew size (excluding captain) by fishery. See above for explanation of changes to the data collection across years (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Activity	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Pacific whiting	2.5	40	2.6	42	2.7	34	2.8	30	2.9	31	2.8	31	2.9	29	2.9	28
Groundfish with midwater trawl gear	—	—	—	—	—	—	—	—	—	—	—	—	2.6	17	2.3	13
Groundfish with trawl gear	2.0	105	2.0	99	2.0	81	2.1	73	2.1	74	2.1	70	2.2	61	2.2	59
Groundfish with fixed gear	1.9	8	2.0	8	2.8	27	2.8	24	2.6	21	—	—	—	—	—	—
Groundfish fixed gear with a trawl permit	—	—	—	—	—	—	—	—	—	—	2.4	20	2.9	18	3.0	18
Groundfish fixed gear with a fixed gear permit	—	—	—	—	—	—	—	—	—	—	3.8	9	3.3	11	3.9	9
Crab	2.8	56	2.9	57	2.9	66	3.0	63	2.9	65	2.9	64	2.9	57	3.0	57
Halibut	1.8	7	1.6	6	1.9	7	2.1	6	2.5	4	—	—	—	—	—	—
Pacific halibut	—	—	—	—	—	—	—	—	—	—	***	***	2.8	4	***	***
California halibut	—	—	—	—	—	—	—	—	—	—	1.2	4	1.0	3	1.3	3
Salmon	***	***	1.7	3	1.8	4	1.4	7	1.5	4	1.0	7	***	***	***	***
Shrimp	2.0	37	2.0	37	2.0	43	2.1	41	2.1	39	2.2	43	2.3	48	2.2	41
Tuna	1.5	15	1.6	14	1.5	7	1.6	11	1.8	8	1.4	8	1.7	9	1.5	8
Steaming between West Coast and Alaska	2.9	31	2.9	33	3.0	31	2.9	31	2.9	28	2.9	29	2.9	25	2.9	27

Average crew size by fishery and vessel length class

Table 6.27: Pacific whiting fishery crew size. Average crew size (not including captain) on vessels that fished in the Pacific whiting fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels <= 80 ft, and small vessels <= 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Small vessel		0		0	***	***		0		0		0		0		0
Medium vessel	2.2	10	2.2	10	2.2	6	2.6	5	2.6	5	2.6	5	2.5	4	2.7	3
Large vessel	2.6	30	2.8	32	2.8	27	2.8	25	3.0	26	2.9	26	2.9	25	2.9	25

Table 6.28: Groundfish with midwater trawl gear fishery crew size. Average crew size (not including captain) on vessels that fished in the groundfish with midwater trawl gear fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels <= 80 ft, and small vessels <= 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Small vessel	—	—	—	—	—	—	—	—	—	—	—	—	***	***	***	***
Medium vessel	—	—	—	—	—	—	—	—	—	—	—	—	2.8	6	2.6	5
Large vessel	—	—	—	—	—	—	—	—	—	—	—	—	2.6	10	2.3	7

Table 6.29: Groundfish with trawl gear fishery crew size. Average crew size (not including captain) on vessels that fished in the groundfish with trawl gear fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels <= 80 ft, and small vessels <= 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Small vessel	1.8	35	1.8	29	1.8	20	1.9	19	1.8	18	1.9	18	1.9	14	1.8	13
Medium vessel	2.1	49	2.1	50	2.1	45	2.1	42	2.2	44	2.2	39	2.3	37	2.3	37
Large vessel	2.3	21	2.3	20	2.4	16	2.3	12	2.3	13	2.4	13	2.2	10	2.6	9

Table 6.30: Groundfish with fixed gear fishery crew size. Average crew size (not including captain) on vessels that fished in the groundfish with fixed gear fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels <= 80 ft, and small vessels <= 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Small vessel	1.3 [†]	6	1.5 [†]	6	2.1 [†]	18	2.1 [†]	14	2.4 [†]	14	—	—	—	—	—	—
Medium vessel	***	***	***	***	3.6 [†]	7	3.5 [†]	8	3.1 [†]	7	—	—	—	—	—	—
Large vessel	***	***	***	***	***	***	***	***		0	—	—	—	—	—	—

Table 6.31: Groundfish fixed gear with a trawl permit fishery crew size. Average crew size (not including captain) on vessels that fished in the groundfish fixed gear with a trawl permit fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels <= 80 ft, and small vessels <= 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Small vessel	—	—	—	—	—	—	—	—	—	—	2.0 [†]	13	2.6 [†]	11	2.8 [†]	10
Medium vessel	—	—	—	—	—	—	—	—	—	—	3.3 [†]	7	3.2 [†]	6	3.3 [†]	7
Large vessel	—	—	—	—	—	—	—	—	—	—		0	***	***	***	***

Table 6.32: Groundfish fixed gear with a fixed gear permit fishery crew size. Average crew size (not including captain) on vessels that fished in the groundfish fixed gear with a fixed gear permit fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels <= 80 ft, and small vessels <= 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Small vessel	—	—	—	—	—	—	—	—	—	—	3.2 [†]	4	2.7 [†]	6	3.5 [†]	4
Medium vessel	—	—	—	—	—	—	—	—	—	—	4.2 [†]	5	3.8 [†]	4	4.0 [†]	4
Large vessel	—	—	—	—	—	—	—	—	—	—		0	***	***	***	***

Table 6.33: Crab fishery crew size. Average crew size (not including captain) on vessels that fished in the crab fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels <= 80 ft, and small vessels <= 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Small vessel	2.3 [*]	29	2.4 [*]	29	2.4 [*]	33	2.5 [*]	30	2.4 [*]	30	2.4 [*]	32	2.3 [*]	28	2.5 [*]	24
Medium vessel	3.4 [*]	21	3.4 [*]	22	3.3 [*]	26	3.3 [*]	26	3.2 [*]	26	3.4 [*]	25	3.4 [*]	22	3.4 [*]	25
Large vessel	3.6 [*]	6	3.3 [*]	6	3.5 [*]	7	3.5 [*]	7	3.6 [*]	9	3.4 [*]	7	3.6 [*]	7	3.6 [*]	8

Table 6.34: Halibut fishery crew size. Average crew size (not including captain) on vessels that fished in the halibut fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels <= 80 ft, and small vessels <= 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Small vessel	1.6 [*]	4	1.5 [*]	3	1.6 [*]	4	***	***	***	***	—	—	—	—	—	—
Medium vessel	***	***	1.7 [*]	3	2.2 [*]	3	2.8 [*]	4	***	***	—	—	—	—	—	—
Large vessel	***	***		0		0		0		0	—	—	—	—	—	—

Table 6.35: Pacific halibut fishery crew size. Average crew size (not including captain) on vessels that fished in the Pacific halibut fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels <= 80 ft, and small vessels <= 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Small vessel	—	—	—	—	—	—	—	—	—	—		0	2.0 [*]	3	***	***
Medium vessel	—	—	—	—	—	—	—	—	—	—	***	***	—	—	—	—
Large vessel	—	—	—	—	—	—	—	—	—	—		0	***	***	***	***

Table 6.36: California halibut fishery crew size. Average crew size (not including captain) on vessels that fished in the California halibut fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels <= 80 ft, and small vessels <= 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Small vessel	—	—	—	—	—	—	—	—	—	—	***	***	***	***	***	***
Medium vessel	—	—	—	—	—	—	—	—	—	—	***	***	***	***	***	***
Large vessel	—	—	—	—	—	—	—	—	—	—		0	—	—	—	—

Table 6.37: Salmon fishery crew size. Average crew size (not including captain) on vessels that fished in the salmon fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels <= 80 ft, and small vessels <= 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Small vessel	***	***	1.7*	3	1.7*	3	1.4*	7	1.5*	4	1.0*	7	***	***	***	***
Medium vessel		0		0		0		0		0		0		0		0
Large vessel		0		0	***	***		0		0		0		0		0

Table 6.38: Shrimp fishery crew size. Average crew size (not including captain) on vessels that fished in the shrimp fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels <= 80 ft, and small vessels <= 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Small vessel	1.8*	11	1.7*	10	1.9*	13	2.1*	11	2.0*	10	2.1*	12	2.1*	14	2.0*	9
Medium vessel	2.0*	22	2.0*	22	2.1*	25	2.0*	22	2.2*	22	2.3*	23	2.3*	26	2.2*	24
Large vessel	2.1*	4	2.1*	5	2.0*	5	2.1*	8	2.1*	7	2.1*	8	2.4*	8	2.5*	8

Table 6.39: Tuna fishery crew size. Average crew size (not including captain) on vessels that fished in the tuna fishery on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels <= 80 ft, and small vessels <= 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Small vessel	1.5 [*]	11	1.6 [*]	11	1.4 [*]	6	1.8 [*]	8	1.7 [*]	6	1.3 [*]	6	1.3 [*]	6	1.0 [*]	4
Medium vessel	1.8 [*]	4	1.7 [*]	3	***	***	1.3 [*]	3	***	***	***	***	***	***	1.3 [*]	3
Large vessel		0		0		0		0		0		0	***	***	***	***

Table 6.40: Steaming between West Coast and Alaska fishery crew size. Average crew size (not including captain) on vessels that steamed between West Coast and Alaska by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels <= 80 ft, and small vessels <= 60 ft) (N = number of EDC vessels with non-zero, non-NA responses). See above for an explanation of EDC form changes (annotated with —) over time.

Vessel length category	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Small vessel		0		0	***	***	***	***	***	***	***	***	***	***	***	***
Medium vessel	3.0 [*]	3	3.0 [*]	4	3.2 [*]	4	2.6 [*]	5	2.8 [*]	4	2.5 [*]	6	2.0 [*]	4	2.2 [*]	5
Large vessel	2.9 [*]	28	2.9 [*]	29	3.0 [*]	25	2.8 [*]	24	2.7 [*]	22	3.0 [*]	21	2.9 [*]	19	3.0 [*]	20

Average total number of individuals employed

Table 6.41: Average number of individuals employed. Average total number of individuals who worked as captain or crew on EDC vessels while fishing on the West Coast (N = number of EDC vessels with non-zero, non-NA responses).

Activity	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Total number of individuals who worked as captain or crew	—	—	—	—	—	—	—	—	6.5 [†]	123	6.5 [†]	125	6.8 [†]	117	6.7 [†]	113

Average total number of individuals employed by vessel length class

Table 6.42: Average number of individuals employed. Average total number of individuals who worked as captain or crew on EDC vessels while fishing on the West Coast by length class of vessel (large vessel > 80 ft, 60 ft < medium vessels <= 80 ft, and small vessels <= 60 ft) (N = number of EDC vessels with non-zero, non-NA responses).

Vessel length category	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Small vessel	—	—	—	—	—	—	—	—	5.2 [†]	41	5.7 [†]	42	6.2 [†]	38	5.6 [†]	33
Medium vessel	—	—	—	—	—	—	—	—	7.0 [†]	50	6.7 [†]	50	6.8 [†]	47	6.5 [†]	47
Large vessel	—	—	—	—	—	—	—	—	7.4 [†]	32	7.3 [†]	33	7.7 [†]	32	8.0 [†]	33

Total number of crew positions and individuals

Table 6.43: Total number of crew positions and individuals employed. Total number of crew positions and individuals employed by EDC vessels in West Coast Fisheries (N = number of EDC vessels with non-zero, non-NA responses). See above for explanation of changes to the data collection across years.

	2009		2010		2011		2012		2013		2014		2015		2016	
	Total	N	Total	N	Total	N	Total	N	Total	N	Total	N	Total	N	Total	N
Positions	275	131	267	129	313	135	302	130	303	124	300	125	297	117	289	113
Individuals	—	—	—	—	—	—	—	—	799	122	816	125	790	115	753	113

7 At-Sea Deliveries and Shoreside Landings

Vessels in the catch share fishery participate in both shorebased and at-sea fisheries, with total landings summarized in Table 7.1 and Figure 41. The only fishery for which vessels deliver at-sea is the whiting fishery. There is also a shorebased whiting fleet. Information about the weight of landings or deliveries is not requested on the EDC forms because this information is obtained from other sources.

Landings and deliveries information are primarily obtained from state fish ticket data and the At-Sea Hake Observer Program database, respectively, accessed through PacFIN. The weight of landings and deliveries made while fishing in Alaska are obtained from the EDC forms. Species composition is available for West Coast fisheries, but not for Alaska fisheries. Alaska landings weights are provided here because they are used for cost disaggregation in Section 9.

Table 7.1: Total shoreside landings and at-sea deliveries. Total landings and deliveries in West Coast at-sea and shoreside fisheries and Alaska (thousands of round metric tons) (N = number of EDC vessels with non-zero, non-NA responses).

Location	2009		2010		2011		2012		2013		2014		2015		2016	
	Total	N	Total	N	Total	N	Total	N	Total	N	Total	N	Total	N	Total	N
At-sea	24.3	19	35.9	21	50.3	18	38.6	16	52.9	18	62.3	19	27.9	14	63.4	16
Shoreside	72.8	123	95.1	122	126.5	127	99.6	124	135.8	114	136.7	115	97.0	110	117.2	108
Alaska	95.8	31	104.1	31	134.6	34	105.6	28	105.7	26	124.5	28	112.5	25	95.0	24
Total landings	192.9	132	235.2	130	311.4	137	243.8	131	294.4	121	323.6	124	237.4	118	275.6	114

7.1 At-sea deliveries

The catcher vessels that deliver at-sea to motherships on the West Coast target Pacific whiting, with very little bycatch (Table 7.2).

Table 7.2: At-sea landings and deliveries. Total at-sea deliveries (metric tons) by species group (N = number of EDC vessels with non-zero, non-NA responses).

Species group	2009		2010		2011		2012		2013		2014		2015		2016	
	Total	N	Total	N	Total	N	Total	N	Total	N	Total	N	Total	N	Total	N
Arrowtooth flounder	1	19	3	20	7	18	2	16	3	18	2	19	1	14	3	17
Coastal pelagics	***	***	0	14	14	10	10	15	86	16	20	16	24	13	116	16
English sole	0	0	***	***	***	***	***	***	0	4	0	0	0	0	***	***
Pacific halibut	0	13	1	13	0	5	0	7	0	12	0	8	***	***	0	5
Pacific herring	0	11	***	***	***	***	***	***	***	***	0	14	0	9	0	8
Pacific whiting	24,090	19	35,713	21	50,051	18	38,480	16	52,472	18	62,098	19	27,665	14	65,035	17
Rex sole	0	0	2	12	2	9	0	10	1	14	1	15	0	11	1	11
Rockfish	1	19	22	21	13	17	24	16	16	18	15	19	13	14	17	17
Sablefish	0	5	5	15	2	14	1	9	3	16	1	14	2	10	10	14
Salmon	1	18	2	20	4	18	7	16	6	18	7	18	1	13	2	17
Sanddab	0	0	0	0	0	0	0	0	***	***	0	0	0	0	***	***
Semi pelagic rockfish	191	19	96	21	81	18	50	16	185	18	88	19	101	14	134	17
Sharks, skates and rays	7	19	57	21	111	18	36	16	45	18	36	19	18	14	75	17
Squid	4	19	22	21	20	18	28	16	56	18	31	19	11	14	23	17
Thornyheads	0	0	0	9	1	9	1	10	6	15	2	16	2	13	3	13
Other flatfish	0	4	***	***	0	4	0	7	0	8	0	5	0	3	***	***
Other groundfish	0	0	0	0	0	5	0	5	0	6	0	10	***	***	0	9
Other species	1	19	2	20	23	18	3	16	4	18	31	19	13	14	71	17
Total deliveries	24,296	19	35,925	21	50,330	18	38,643	16	52,885	18	62,332	19	27,851	14	65,491	17

7.2 Shoreside landings

Pacific whiting makes up the largest part of the total catch by weight in the shoreside groundfish trawl fisheries (Table 7.3). The next most common species by weight are dover sole, sablefish, petrale sole, and thornyheads. Between 2009 and 2016, there were 9 species grouped into the “other groundfish” species category. By weight, the most common were grenadier, spotted ratfish, and unspecified groundfish. Crab and shrimp comprise the largest component of total shoreside deliveries by weight (Table 7.4).

Table 7.3: Shoreside landings and deliveries: groundfish. Total shoreside landings (metric tons) by species group of groundfish (N = number of EDC vessels with non-zero, non-NA responses).

Species group	2009		2010		2011		2012		2013		2014		2015		2016	
	Total	N	Total	N	Total	N	Total	N	Total	N	Total	N	Total	N	Total	N
Arrowtooth flounder	3,792	102	3,253	98	2,280	84	2,280	88	1,988	86	1,225	82	1,336	81	1,090	79
Dover sole	11,492	118	10,398	112	7,648	92	7,206	91	7,991	85	6,274	82	6,353	87	7,113	79
English sole	266	112	158	104	110	70	117	71	198	69	194	60	245	64	296	63
Lingcod	110	123	74	108	253	88	355	90	336	92	247	93	199	89	274	84
Pacific cod	105	50	143	46	263	44	396	28	154	27	166	31	377	39	386	37
Pacific whiting	39,808	36	59,090	44	88,609	62	65,742	66	95,731	62	103,114	58	61,069	60	86,280	68
Petrale sole	1,682	116	777	108	789	75	1,065	76	2,099	77	2,247	76	2,511	71	2,460	68
Rex sole	529	118	445	111	364	82	365	83	468	81	380	75	472	77	522	71
Rockfish	434	131	481	121	291	106	475	105	447	102	380	99	450	92	370	87
Sablefish	3,276	131	2,934	119	3,071	112	2,691	108	2,199	99	2,312	99	2,700	95	2,794	90
Sanddab	294	58	152	42	141	30	148	32	203	36	267	47	158	28	97	34
Semi pelagic rockfish	541	122	688	116	1,217	91	1,469	88	1,550	93	2,150	88	2,534	80	2,257	78
Sharks, skates and rays	1,370	121	1,361	114	1,314	92	1,305	90	1,098	94	1,283	87	1,197	81	1,361	80
Thornyheads	2,435	118	2,486	115	1,617	95	1,604	100	1,881	94	1,528	90	1,461	90	1,384	84
Other flatfish	128	68	109	60	101	60	98	51	38	50	63	43	45	44	63	42
Other groundfish	88	36	116	57	92	47	85	51	58	45	35	42	21	54	29	55
Total landings	66,349	133	82,664	126	108,159	118	85,401	111	116,437	110	121,865	107	81,126	98	106,777	95

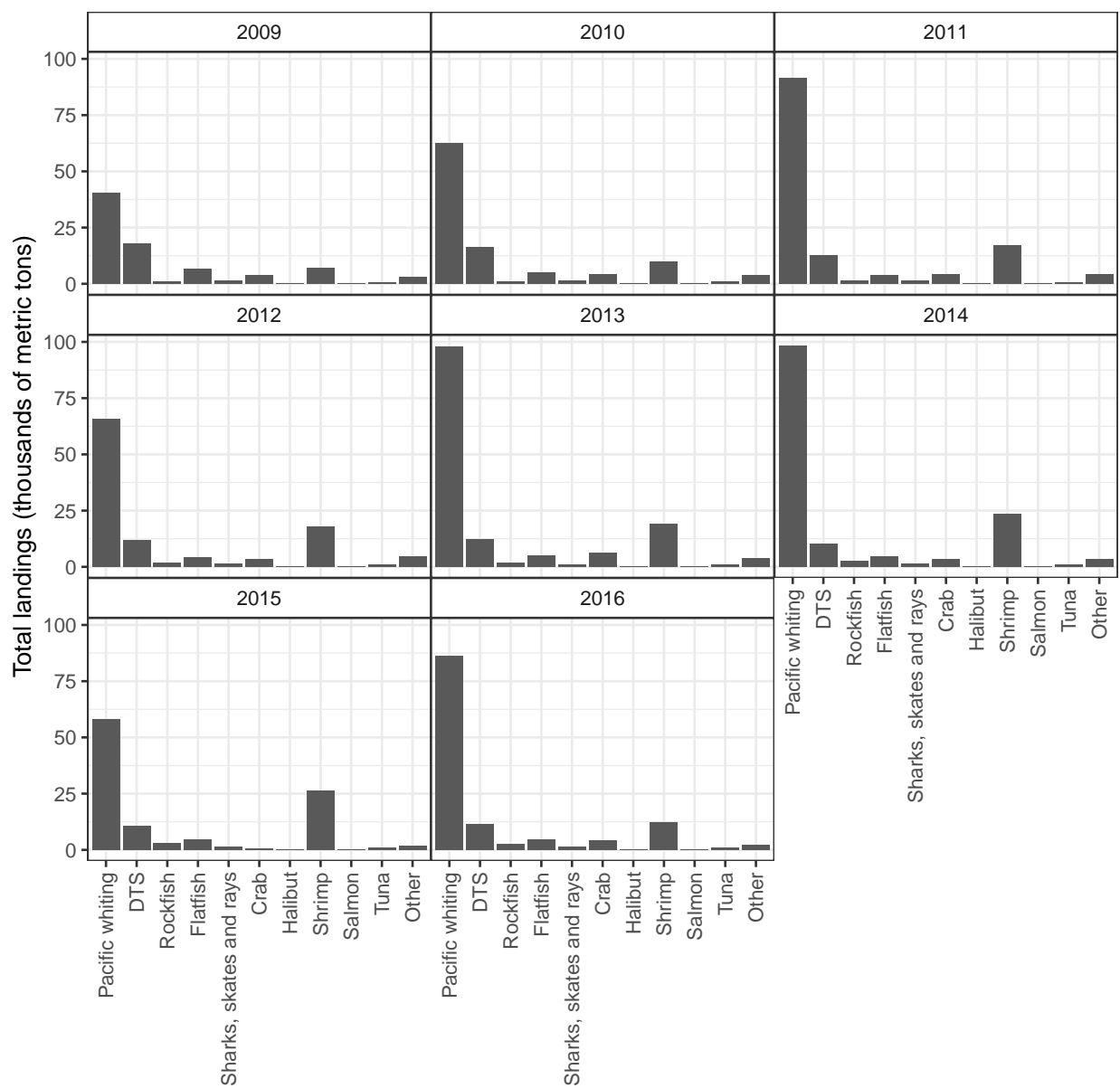


Figure 41: Total landings by species group (thousands of metric tons).

Table 7.4: Shoreside landings and deliveries: non-groundfish. Total shoreside landings (metric tons) by species group of non-groundfish species (N = number of EDC vessels with non-zero, non-NA responses).

Species group	2009		2010		2011		2012		2013		2014		2015		2016	
	Total	N	Total	N	Total	N	Total	N	Total	N	Total	N	Total	N	Total	N
California halibut	48	7	56	10	48	6	38	4	41	6	38	5	25	4	27	5
Coastal pelagics	1	32	4	26	24	30	46	30	126	26	314	26	257	27	170	26
Crab	2,572	78	2,315	76	2,658	89	2,045	76	3,990	79	1,830	73	322	60	2,519	64
Echinoderms	0	8	***	***	***	***	0	8	0	6	***	***	0	0	0	0
Pacific halibut	2	15	***	***	6	25	5	25	4	30	2	27	11	28	10	32
Pacific herring	0	6	48	12	1	11	0	5	0	8	14	18	44	22	3	21
Salmon	1	30	17	35	33	31	37	37	36	34	46	38	16	37	6	30
Sharks, skates and rays	1	26	32	44	7	52	21	41	3	22	6	27	43	58	10	51
Shrimp	5,323	34	7,515	40	12,921	43	11,710	39	13,163	38	17,122	41	18,133	47	8,796	36
Squid	34	63	118	51	18	45	25	41	19	36	31	39	41	31	19	33
Sturgeon	0	3	***	***	0	0	0	0	0	0	0	0	0	0	0	0
Tuna	127	20	171	17	59	9	101	16	18	7	64	8	168	12	92	10
Other shellfish	3	33	2	32	1	32	2	25	2	24	2	20	3	23	3	18
Other species	68	59	31	59	12	64	154	63	81	63	56	58	163	52	191	52
Total landings	8,182	126	10,314	125	15,816	117	14,186	118	17,482	116	19,525	115	19,223	113	11,849	107

8 Revenues

There are several sources of earnings for vessels on the West Coast. The primary source is revenue from sale of fish. Ex-vessel revenue is available for all shoreside deliveries (Figure 42), but is not available for at-sea deliveries. EDC data are used for all at-sea delivery revenues. Additionally, the EDC Program has information about revenue from sale or lease of permits, quota shares, and quota pounds, and from other activities like chartering and research. The full suite of earnings sources can be found in Table 8.1.

Table 8.1: Average annual revenue. Annual average revenue (thousands of \$) for all categories by survey year (N = number of EDC vessels with non-zero, non-NA responses).

Activity	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Alaska shoreside landings and at-sea deliveries	\$1,227	31	\$1,321	31	\$1,841	34	\$1,836	28	\$1,681	26	\$1,680	27	\$1,587	25	\$1,410	24
At-sea deliveries	\$308	20	\$412	20	\$576	18	\$568	16	\$578	19	\$675	18	\$491	15	\$609	17
Shoreside deliveries	\$382	139	\$404	133	\$660	131	\$629	125	\$833	115	\$804	115	\$709	113	\$759	109
Sale of quota shares	***	***	0	0	***	***	***	***	***	***	***	***	\$113	3	\$65	3
Lease of quota shares	0	0	\$60	11	\$60	11	\$83	12	\$97	5	\$53	17	\$37	13	\$48	10
Sale of quota pounds	***	***	***	***	\$54	12	\$20	16	\$40	37	—	—	—	—	—	—
Lease of quota pounds	0	0	***	***	\$67	48	\$73	41	\$18	10	—	—	—	—	—	—
Sale or lease of quota pounds	—	—	—	—	—	—	—	—	—	—	\$31	42	\$35	41	\$43	37
Sale of West Coast limited entry trawl permits	0	0	\$403	3	***	***	***	***	0	0	***	***	0	0	0	0
Lease of West Coast limited entry trawl permits	***	***	***	***	\$82	7	\$39	6	\$52	4	***	***	***	***	\$34	3
Sale of other permits	\$136	3	\$85	3	\$181	5	***	***	0	0	—	—	—	—	—	—
Lease of other permits	***	***	***	***	\$142	6	***	***	***	***	—	—	—	—	—	—
Sale of West Coast limited entry fixed gear permits	—	—	—	—	—	—	—	—	—	—	***	***	0	0	***	***
Lease of West Coast limited entry fixed gear permits	—	—	—	—	—	—	—	—	—	—	***	***	***	***	***	***
Leasing the vessel	—	—	—	—	—	—	***	***	***	***	—	—	—	—	—	—
Salmon disaster payments	\$26	16	\$2	3	***	***	0	0	0	0	0	0	0	0	0	0
Insurance settlements	—	—	—	—	—	—	—	—	***	***	\$41	4	\$116	8	\$15	4
Other	\$89	16	\$117	9	\$135	11	\$103	8	\$118	20	\$92	14	\$213	11	\$237	11
Chartering or leasing the vessel	\$117	11	\$157	11	\$180	13	—	—	—	—	\$264	3	\$329	3	\$273	4
Chartering, research, or tendering on the West Coast	—	—	—	—	—	—	\$163	10	\$101	9	\$149	10	\$147	10	\$178	10
Chartering, research, or tendering in Alaska	—	—	—	—	—	—	\$303	3	\$199	7	\$238	5	\$360	7	\$268	5
Average total revenue	\$688	147	\$768	141	\$1,202	142	\$1,127	133	\$1,332	122	\$1,296	124	\$1,153	121	\$1,186	115

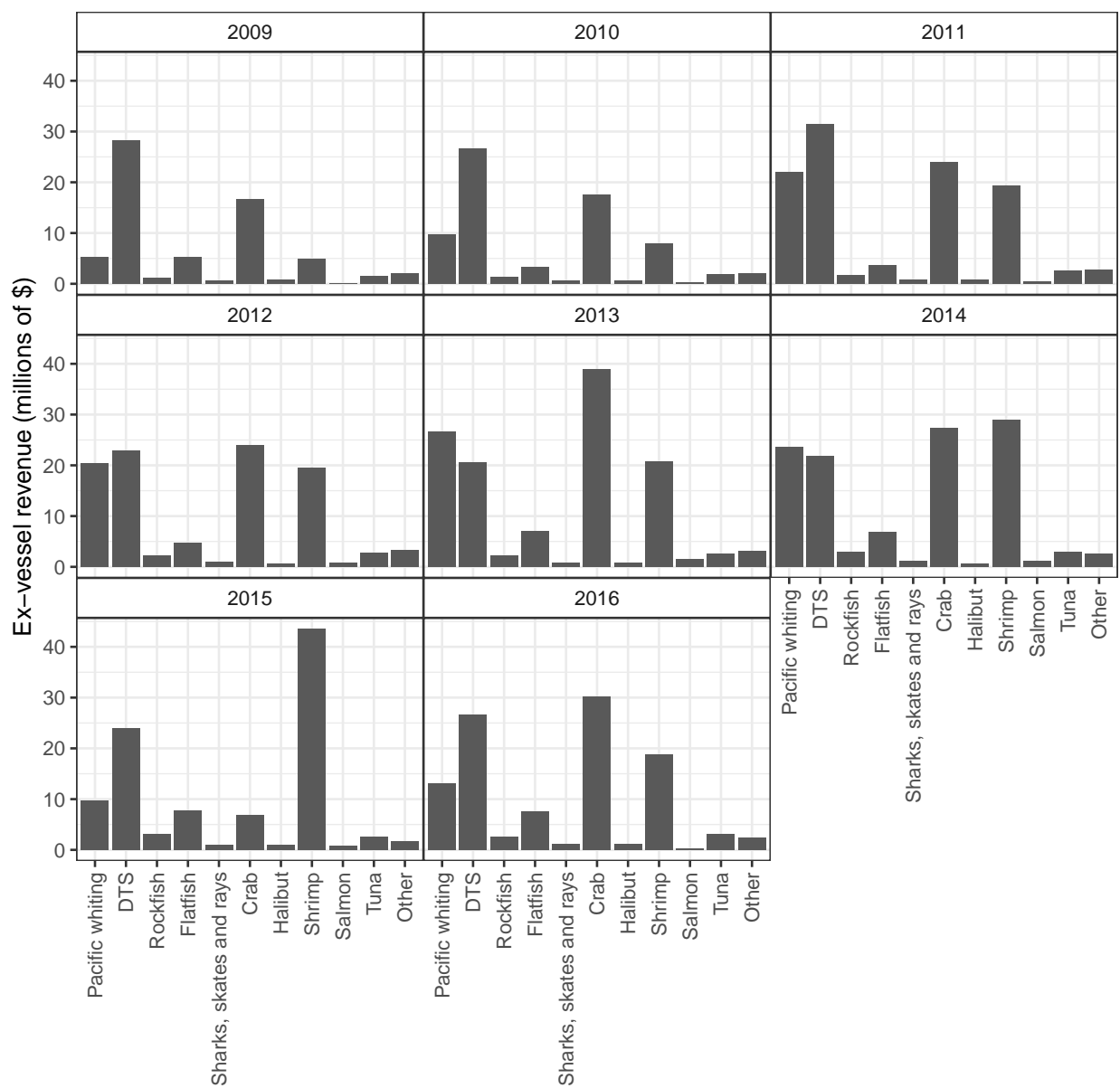


Figure 42: Total ex-vessel shoreside revenue (millions of dollars).

9 Costs

This section summarizes data reported by participants on variable costs, fixed costs, total costs, and how those costs are disaggregated to estimate the proportion of each cost that was incurred for West Coast fisheries.

For the purposes of the EDC Program, costs are divided into two categories, variable costs and fixed costs. Variable costs vary with the level of fishery participation, and generally include items such as fuel and crew payments. Fixed costs do not vary as directly with the level of fishery participation, and generally include items such as vessel capital improvements. The designation of a cost as variable or fixed depends on many factors, including the relevant time horizon and use of the data. While some costs would clearly be considered fixed (e.g., the purchase of a new engine), others are more difficult to categorize as fixed versus variable. For the purposes of this report, we consider the costs listed in Table 9.1 to be variable, and the costs listed in Tables 9.2, 9.3 and 9.5 to be fixed.

The EDC form collects both “capitalized expenditures” and “expenses” for vessel improvements and maintenance, fishing gear, and processing equipment. This is because certain costs may be treated for tax accounting purposes as either capitalized or expensed. Capitalized expenditures are depreciated over a number of years. Expensed items are fully deducted as a cost for the year in which they occur. In an effort to reduce the reporting burden and errors, these data are collected as they are reported in the business’ accounting system.

In order to conduct economic analyses of specific fisheries, it is important to have costs broken out by fishery. For some costs, it may be feasible for participants to break out or track costs at the fishery level. However, for most costs this is impossible, or would require additional burden to do so. During the EDC form development process, a key issue was the determination of which costs could reasonably be broken out by fishery or groups of fisheries. Each cost item was assigned to one or more fishery-group category based on how they are commonly tracked by industry members: 1) used on West Coast fisheries only (West Coast Only); 2) used on the West Coast and in other fisheries (Shared); and 3) used in all fisheries (All) regardless of whether they are used on the West Coast.

Some costs that are required for economic analysis are not asked for on the EDC forms because they are available through other sources, or can be calculated through fish ticket or permit office data. These include fish landings taxes and fees.

Finally, there are a variety of costs that are associated with running a catcher vessel that are not requested on the form because it is difficult to determine the share of the cost associated with the vessel. These costs include items that can be used for activities other than fishing, or are too difficult to allocate to a particular vessel in a multi-vessel company. These expenses include office space, pickup trucks, storage of equipment, professional fees, and marketing. In general, the EDC forms aim to capture costs that are directly related to vessel maintenance and fishing operations, and not costs that are related to activities or equipment off the vessel. For these reasons, the EDC aggregated measures of costs (variable costs, fixed costs, and total costs) underestimate the true costs of operating a business.

9.1 Variable costs

Variable costs were collected for all West Coast activities, including chartering or research. Unlike fixed costs, variable costs are directly related to fishing operations, and therefore, it was possible for vessels to separate expenses for activities on the West Coast from other activities. In all years, crew compensation made up the largest portion of total variable expenses, followed by captain compensation, and fuel and lubrication (Table 9.1). Together, these expenses made up 75.9% of all variable costs on the West Coast in 2016.

Table 9.1: Variable expenses. Average variable costs on the West Coast for EDC vessels (thousands of \$) (N = number of EDC vessels with non-zero, non-NA responses).

Expense category	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Bait	\$9.4	66	\$9.9	63	\$14.9	74	\$17.2	70	\$19.0	66	\$19.7	59	\$14.1	51	\$26.2	55
Buyback fees	\$15.4	143	\$18.2	139	\$30.0	113	\$27.6	109	\$33.5	104	\$33.9	101	\$24.3	96	\$30.5	97
Captain	\$67.3	119	\$72.7	118	\$107.6	120	\$107.9	115	\$127.6	114	\$132.4	113	\$118.6	107	\$127.8	104
Communication	\$2.3	121	\$2.6	114	\$2.5	130	\$2.4	125	\$3.2	120	\$3.3	118	\$3.6	115	\$4.5	113
Cost recovery fees	0	0	0	0	0	0	0	0	0	0	\$19.5	101	\$13.7	96	\$17.7	97
Crew	\$86.8	128	\$96.3	128	\$147.6	131	\$147.2	127	\$174.1	120	\$179.8	120	\$157.6	116	\$164.0	113
Fishing association dues	\$4.0	85	\$3.9	79	\$6.0	94	\$7.6	86	\$8.1	86	\$9.7	97	\$9.7	98	\$7.8	84
Food	\$5.6	126	\$5.6	119	\$6.5	106	\$7.1	91	\$7.4	92	\$7.1	91	\$7.1	83	\$7.6	82
Freight	\$0.6	30	\$0.7	26	\$2.3	24	\$1.1	23	\$1.6	24	\$1.3	23	\$1.0	24	\$1.5	20
Fuel and lubrication	\$50.7	144	\$68.8	136	\$81.7	134	\$92.6	129	\$94.5	120	\$96.9	120	\$65.6	117	\$62.0	114
Ice	\$6.5	109	\$5.7	104	\$5.9	102	\$6.4	96	\$7.7	89	\$10.5	87	\$11.6	84	\$10.7	82
License fees	***	***	\$0.3	13	\$3.3	129	\$3.8	125	\$3.6	118	\$2.6	116	\$3.5	115	\$2.9	109
Observers	\$6.0	11	\$7.5	16	\$3.1	102	\$5.7	103	\$10.9	101	\$15.5	98	\$18.1	94	\$19.6	93
Offloading	\$4.0	58	\$4.6	53	\$5.4	57	\$8.0	38	\$5.2	35	\$5.0	37	\$4.3	40	\$4.1	40
Supplies	\$8.7	110	\$9.8	101	\$5.9	100	\$6.4	98	\$7.1	91	\$8.9	85	\$8.8	86	\$12.3	80
Travel	\$1.8	47	\$1.8	40	\$1.7	28	\$2.2	24	\$2.1	29	\$3.1	35	\$3.2	33	\$2.6	35
Trucking of fish	***	***	\$1.4	12	\$3.7	9	\$4.5	6	\$3.9	4	\$4.7	7	\$1.8	7	\$2.6	5
Washington fish taxes	\$3.0	21	\$3.0	26	\$5.6	31	\$6.1	24	\$7.4	22	\$6.6	29	\$6.5	29	\$4.7	28
Average total	\$227.1	144	\$262.9	140	\$380.9	136	\$401.0	129	\$471.8	120	\$506.1	120	\$421.4	117	\$449.3	114

9.2 Fixed costs

Costs on vessel and on-board equipment, fishing gear, and processing equipment

Survey participants are asked to provide capitalized expenditures (Table 9.2) and expenses (Table 9.3) for the survey year associated with the following categories:

- New and used vessel and on-board equipment: Includes all electronics, safety equipment, and machinery not used to harvest fish, but not fishing gear or processing equipment
- Fishing gear: Includes nets, doors, traps, pots, cables, and fishing machinery used for the West Coast fisheries
- Processing Equipment: Includes any equipment used to process or head and gut fish on-board the vessel

From 2009-2013, participants were asked to report capitalized expenditures and expenses separately (Tables 9.2 and 9.3). Beginning in 2014, the EDC survey was changed and participants now report total costs (capitalized expenditures and expenses combined) 9.4). This information is reported in three tables to document exactly what data were collected and how, a summary table of the West Coast portion of these costs is also available (first three rows of Table 12.1).

Table 9.2: Capitalized expenditures on vessel and on-board equipment, fishing gear, and processing equipment. Average capitalized expenditures (thousands of \$) on vessel and on-board equipment, fishing gear, and processing equipment. See above for explanation of changes to the data collection across years, and the resulting new summary in Table 12.1 (N = number of EDC vessels with non-zero, non-NA responses).

Expenditure category	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Vessel and on-board equipment in all fisheries	\$62.0:	90	\$56.3:	82	\$66.5:	103	\$85.3:	92	\$114.6:	76	—	—	—	—	—	—
Fishing gear shared between the West Coast and other fisheries	\$40.0:	30	\$46.9:	28	\$91.8:	29	\$86.0:	16	\$59.3:	11	—	—	—	—	—	—
Fishing gear used only on the West Coast	\$22.4:	83	\$22.8:	75	\$40.5:	94	\$26.8:	81	\$31.4:	33	—	—	—	—	—	—
Processing equipment shared between the West Coast and other fisheries	0	0	0	0	***	***	***	0	***	***	—	—	—	—	—	—
Processing equipment used only on the West Coast	\$20.5:	15	\$24.7:	9	\$3.0:	7	***	***	***	***	—	—	—	—	—	—
Average total	\$79.2:	113	\$77.8:	101	\$106.8:	125	\$109.6:	104	\$114.3:	91	—	—	—	—	—	—

Table 9.3: Expenses on vessel and on-board equipment, fishing gear, and processing equipment. Average expenses (thousands of \$) on vessel and on-board equipment, fishing gear, and processing equipment. See above for explanation of changes to the data collection across years, and the resulting new summary in Table 12.1 (N = number of EDC vessels with non-zero, non-NA responses).

Expense category	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Vessel and on-board equipment in all fisheries	\$62.5	133	\$57.8	124	\$88.0	117	\$98.0	116	\$82.2	98	—	—	—	—	—	—
Fishing gear shared between the West Coast and other fisheries	\$35.8	42	\$48.4	40	\$95.7	35	\$146.3	28	\$141.7	16	—	—	—	—	—	—
Fishing gear used only on the West Coast	\$19.0	118	\$20.7	109	\$25.3	109	\$35.8	106	\$35.9	62	—	—	—	—	—	—
Processing equipment shared between the West Coast and other fisheries		0	\$1.1	8	\$16.3	5	\$10.3	4	\$2.0	5	—	—	—	—	—	—
Average total	\$83.1	145	\$82.4	138	\$121.3	136	\$145.1	133	\$114.2	110	—	—	—	—	—	—

Other fixed costs

Table 9.4: Capitalized expenditures and expenses on vessel and on-board equipment, fishing gear, and processing equipment. Average expenses (thousands of \$) on vessel and on-board equipment, fishing gear, and processing equipment. Beginning in 2014, participants reported combined capitalized expenditures and expenses, the costs collected in the original format can be found in Tables 9.2 and 9.3 (N = number of EDC vessels with non-zero, non-NA responses).

Expense category	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Vessel and on-board equipment in all fisheries	—	—	—	—	—	—	—	—	—	—	\$171.2:	99	\$100.9:	105	\$105.2:	103
Fishing gear shared between the West Coast and other fisheries	—	—	—	—	—	—	—	—	—	—	\$104.0:	14	\$74.2:	18	\$84.6:	21
Fishing gear used only on the West Coast	—	—	—	—	—	—	—	—	—	—	\$37.3:	63	\$40.4:	66	\$41.4:	58
Processing equipment shared between the West Coast and other fisheries	—	—	—	—	—	—	—	—	—	—	—	0	—	0	—	0
Processing equipment used only on the West Coast	—	—	—	—	—	—	—	—	—	—	***	***	\$0.7:	3	\$39.7:	3
Average total	—	—	—	—	—	—	—	—	—	—	\$185.4:	112	\$128.0:	114	\$138.9:	109

Table 9.5: Other fixed expenses. Average fixed expenses (thousands of \$) on all other categories (N = number of EDC vessels with non-zero, non-NA responses).

Expense	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Insurance	\$34.8:	134	\$34.4:	129	\$37.6:	131	\$38.6:	126	\$43.4:	118	\$45.7:	120	\$43.9:	117	\$48.1:	113
Lease of vessel	\$86.3:	12	\$107.7:	10	\$89.9:	10	\$65.9:	8	\$106.4:	8	\$105.2:	8	\$156.9:	8	\$143.7:	10
Moorage	\$5.4:	144	\$5.9:	134	\$6.1:	139	\$6.8:	132	\$7.3:	123	\$7.5:	124	\$7.4:	120	\$7.6:	115
Average total	\$44.0:	147	\$45.1:	140	\$47.3:	141	\$47.2:	133	\$55.4:	124	\$58.0:	125	\$60.1:	121	\$66.2:	117

Table 9.6: Depreciation. Average depreciation (thousands of \$) taken during the survey year (N = number of EDC vessels with non-zero, non-NA responses).

Expense	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Depreciation	\$76.1	101	\$68.5	92	\$107.1	98	\$103.5	89	\$93.0	86	\$85.8	89	\$100.3	89	\$115.2	79

9.3 Quota and permit costs on the West Coast

EDC participants are asked to provide information about the costs related to purchasing or leasing permits, quota shares, and quota pounds. Up until 2014, participants were asked to report total expenses related to purchase of quota pounds separately from the expenses related to lease of quota pounds. This question caused confusion among participants because they use those terms interchangeably. The change in the question format can be seen in Table 9.7 where “—” indicates years in which the question was not asked.

Table 9.7: Quota and permit costs. Average costs (thousands of \$) related to lease and purchase of quota shares, quota pounds, and limited entry groundfish permits. See above for explanation of changes to the data collection across years (N = number of EDC vessels with non-zero, non-NA responses).

Expense	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Purchase of trawl limited entry permit	\$28.9	8	***	***	***	***	***	***	***	***	***	***	***	***	***	***
Lease of trawl limited entry permit	\$15.7	9	\$14.1	8	\$25.4	11	\$17.9	10	\$10.1	7	\$25.4	10	\$9.0	10	\$8.4	11
Purchase of fixed gear limited entry permit	0	0	0	0	***	***	***	0	***	***	***	***	***	0	***	***
Lease of fixed gear limited entry permit	0	0	0	0	***	***	\$101.4	5	\$57.7	3	***	***	\$51.0	3	\$94.7	3
Purchase of quota shares	0	0	0	0	***	***	***	***	***	***	***	***	***	***	\$19.5	6
Lease of quota shares	0	***	***	***	\$22.1	3	\$41.6	5	\$97.0	9	\$68.8	20	\$50.9	15	\$57.1	14
Purchase of quota pounds	0	***	***	***	\$16.5	16	\$18.6	15	\$26.8	9	—	—	—	—	—	—
Lease of quota pounds	\$19.1	3	\$35.1	6	\$86.9	64	\$67.3	60	\$49.8	60	—	—	—	—	—	—
Purchase or lease of quota pounds	—	—	—	—	—	—	—	—	—	—	\$64.4	51	\$63.2	63	\$74.7	69
Average total quota and permit costs	\$21.5	20	\$30.0	24	\$101.2	80	\$65.3	80	\$108.0	78	\$72.0	76	\$74.0	76	\$89.2	80

9.4 Landings taxes and fees

Costs associated with landings taxes were not requested on the catcher vessel forms because it can be calculated based on gross shoreside landings information. These tax costs were calculated according to the table provided in Leonard and Watson (2011).¹¹ Beginning in 2014, NMFS began collecting “Cost Recovery fees” as authorized by the MSA to “recover the actual cost directly related to the management, data collection, and enforcement of any limited access privilege program.” The shoreside fleet currently pays cost recovery fees of 3% (the maximum allowed by the MSA) of total ex-vessel revenue. The mothership sector paid 2.1% (average 2014-2015) and catcher-processors paid 0.8% of the value of the fish processed. Since the mothership sector does not report ex-vessel prices at the time of delivery and there is no ex-vessel price for the catcher-processor catch, the cost recovery fees are based on prices estimated by PacFIN.

10 Crew Share System

The most common system for remunerating crew is the crew share system where crew are paid a percentage of the total revenue earned by the vessel after certain expenses are deducted. Most vessels in the groundfish trawl fishery use this system (Table 10.1).

Participants are asked to provide the percentage of fishing trips in which the vessel owner served as captain in West Coast groundfish fisheries (Table 10.2). Average crew share distributions when the vessels were owner-operated and when they were operated by a hired captain are summarized in Tables 10.3 and 10.4, respectively. In 2012, 12 participants provided the response “NA”. These responses are most commonly a result of ownership of a vessel by an LLC that is not identified with a specific person who could operate the vessel as a captain.

¹¹ Leonard, J., and P. Watson. 2011. Description of the input-output model for Pacific Coast fisheries. U.S. Dept. Commer., NOAA Tech. Memo. NMFS-NWFSC-111, 64 p.

Table 9.8: Landings taxes. Average fees and Washington state taxes (thousands of \$) paid by vessels (N = number of EDC vessels with non-zero, non-NA responses).

Expense	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Buyback fees	\$15.9:	132	\$19.2:	130	\$31.4:	131	\$25.7:	126	\$30.4:	121	\$30.0:	121	\$23.7:	104	\$30.0:	100
Cost recovery fees		0		0		0		0		0	\$18.2:	105	\$13.8:	97	\$17.3:	97
WA fish taxes	\$3.0:	20	\$3.1:	25	\$5.5:	29	\$6.1:	24	\$7.4:	22	\$6.5:	30	\$6.3:	30	\$4.7:	28
Average total	\$16.3:	132	\$19.8:	130	\$32.3:	132	\$26.9:	126	\$31.4:	122	\$47.0:	122	\$37.7:	106	\$45.7:	105

Table 10.1: Frequency of crew share systems. Number of entities who used a crew share system, did not use a crew share system, or did not respond to the question. An entity is defined as a unique combination of an owner or lessee and vessel, whereas a vessel refers to all activities related to that vessel, regardless of the number individuals who owned or leased the vessel.

Crew share system	2009	2010	2011	2012	2013	2014	2015	2016
YES	124	120	113	108	100	97	99	90
NO	1	1	2	1	4	2	0	0
No response	0	0	0	0	2	2	0	5

Table 10.2: Percent of trips with owner-operated vessels. Average percentage of trips when the vessel owner served as captain on vessels with at least one owner-operated trip (N = number of EDC vessels with non-zero, non-NA responses).

	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Percentage of trips vessel owner served as captain	87.3	50	81.9	51	88.9	51	80.7	42	86.0	36	83.2	37	81.2	38	75.4	33

Table 10.3: Average crew shares when vessels were owner-operated. Average share (percent of ex-vessel revenue after deducting certain costs) paid to captain, crew, vessel, and other on trips when the vessel owner served as captain (N = number of EDC vessels with non-zero, non-NA responses).

Share	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean %	N	Mean %	N	Mean %	N	Mean %	N	Mean %	N	Mean %	N	Mean %	N	Mean %	N
Captain share	24.5*	41	20.5*	36	22.5*	41	19.3*	33	22.4*	28	20.4*	27	16.8*	29	17.4*	29
Crew share	24.2*	52	22.9*	52	25.0*	52	24.9*	45	25.4*	36	24.5*	37	25.8*	39	26.6*	37
Vessel share	58.8*	51	62.3*	51	59.8*	51	60.5*	45	61.8*	37	59.6*	35	60.3*	38	59.0*	36
Other share	—	—	—	—	12.7*	3	24.0*	5	14.0*	5	24.3*	3	10.0*	3	***	***

Table 10.4: Average crew shares when using a hired captain. Average share (percent of ex-vessel revenue after deducting certain costs) paid to captain, crew, vessel, and other on trips when the vessel owner did not serve as captain (N = number of EDC vessels with non-zero, non-NA responses).

Share	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean %	N	Mean %	N	Mean %	N	Mean %	N	Mean %	N	Mean %	N	Mean %	N	Mean %	N
Captain share	17.7	94	17.8	93	17.9	91	18.0	87	17.9	84	18.6	84	17.5	80	17.9	79
Crew share	21.7	98	21.2	96	22.2	93	22.4	89	22.4	86	23.8	86	22.7	82	22.7	80
Vessel share	60.4	96	61.0	94	59.3	92	59.3	89	59.2	85	58.4	88	60.0	83	59.3	80
Other share	—	—	—	—	7.5	4	8.0	8	14.2	9	5.6	7	7.2	5	5.2	4

Catcher Vessel Data Analysis

The data summaries above provide important information about the vessels that participate in the catch share program. To analyze the effect of the program on vessels, additional analysis is necessary. The following sections combine the EDC data with additional data sources such as fish ticket data and observer data to calculate fishery level costs and subsequently, net revenue. The final section presents these measures as rates in order to better understand how changes observed are related to changes in TAC and fishing effort.

11 Days at Sea by Fishery

Although the data provided on the EDC forms provide most of the information necessary for examining fishery participation, several of the days at sea need to be further split into subfisheries using information from state fish tickets obtained from the PacFIN database, data collected by the At-Sea Hake Observer Program (A-SHOP) obtained from the NORPAC database, and EDC data (ex-vessel revenue from at-sea deliveries).

The days at sea question remained constant from 2009-2013. For these years, the “West Coast whiting trawl gear (not including other groundfish)” (whiting) days are split into At-sea Pacific whiting and Shoreside Pacific whiting fisheries. The “West Coast groundfish trawl gear” days are split into Dover-thornyhead-sablefish (DTS) with trawl gear and Non-whiting, non-DTS groundfish with trawl gear, and the “West Coast groundfish fixed gear” days are split into Groundfish fixed gear with fixed gear endorsement and Groundfish fixed gear with trawl endorsement fisheries.

Although the days at sea question was not changed until 2014, fishing behavior began changing in 2012. As described in Section 3, the Non-whiting midwater trawl fishery resumed in 2012. Therefore, for three years (2012-2014), the days were manually split using the whiting and groundfish trawl days reported on the forms. Whether days at sea for the midwater trawl fishery were derived by subtracting from the reported days for whiting or non-whiting groundfish was determined on a case by case basis because there were no specific instructions about how to report this “new” fishery for participants. In 2015, the “West Coast midwater trawl gear” category was added to the forms and can now be used as it is submitted.

The number of EDC participants fishing in “Other fisheries” (halibut, salmon, tuna, open access groundfish, fixed gear groundfish without a limited entry permit) has decreased over time from a maximum of 29 in 2010 and 2012, to 22 in 2014 and 2015. In terms of active catch share participants (or Limited Entry Trawl in 2009 and 2010), the number dropped from 23 in 2009 and 2010 to 15 in 2015. Other fisheries with the highest total ex-vessel revenue

were tuna (\$298,000 in 2015) and halibut (\$344,000 in 2015). Tuna had the largest number of participating vessels, ranging from 6 (2013) to 15 (2010).

Allocation of the reported days at sea into the subfisheries is a two-step process. First, ex-vessel revenue is used to categorize each delivery into a subfishery (At-sea Pacific whiting, Shoreside Pacific whiting, Non-whiting midwater trawl, DTS trawl with trawl endorsement, Non-whiting, non-DTS with trawl endorsement, Groundfish fixed gear with trawl endorsement). Fish ticket data are used to designate each unique delivery to a fishery by compiling data from the start date of the vessel's fiscal year through one full year. A delivery is assigned to a particular fishery based on the species or species group that resulted in the highest revenue for that delivery. For example, if a fish ticket for a particular vessel on a specific day had a mix of rockfish and Pacific whiting, and the Pacific whiting landings accounted for the majority of the revenue, then all landings associated with that trip are designated as "Pacific whiting fishery".

Once each landing/delivery is classified into a subfishery, the reported days at sea are distributed to the subfisheries proportional to the ex-vessel revenue of landings/deliveries in each subfishery. The average and total fleet-wide allocated days at sea in each of the subfisheries is summarized in Tables 11.1 and 11.2, respectively. Days at sea are not available for all fisheries and all years due to changing conditions within the fishery and/or changes in survey data collection. Vessels did not begin participating in the non-whiting midwater trawl fishery until 2012.

Landings weight was explored as an alternative to using revenue to classify deliveries by subfishery. We compared the results of two approaches: using the highest revenue method versus the highest landings weight method for designating the subfishery. The two methods resulted in identification of the same fishery for 95% of all cases. Given that there were few differences in identification of the fisheries, revenue was selected over landings weight because it is assumed to represent the target species more accurately.

Table 11.1: Average days at sea by fishery. Average days at sea by fishery for EDC vessels (N = number of EDC vessels with non-zero, non-NA responses). The Other fisheries category includes salmon, tuna, halibut, and groundfish caught without a limited entry permit.

Activity	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
At-sea Pacific whiting	20.9	19	29.9	21	39.5	18	42.2	16	38.9	18	42.3	19	44.4	14	76.3	16
Shoreside Pacific whiting	27.4	34	39.6	35	52.9	26	53.6	25	58.6	24	64.5	25	57.3	22	63.8	23
Non-whiting midwater trawl	0	0	0	0	0	0	9.8	5	14.9	5	3.8	9	13.0	12	11.3	9
DTS trawl with trawl endorsement	55.5	99	52.6	91	45.8	63	40.0	58	43.9	58	38.8	51	33.5	51	32.9	50
Non-whiting, non-DTS trawl with trawl endorsement	22.5	78	18.7	52	20.5	43	26.7	45	29.6	42	25.5	49	31.1	36	24.9	46
Groundfish fixed gear with trawl endorsement	24.8	5	51.3	6	31.5	24	32.8	26	22.9	15	34.8	16	32.4	17	30.8	18
Groundfish fixed gear with fixed gear endorsement	37.3	4	23.7	3	20.0	8	25.4	10	30.6	9	54.1	9	26.5	10	38.4	9
Crab	45.3	56	39.8	57	38.3	65	39.9	61	42.0	64	39.5	58	26.8	50	36.5	58
Shrimp	31.5	31	36.9	36	43.3	41	46.5	39	45.7	36	57.5	41	69.8	46	57.8	36
Alaska	101.8	31	111.2	31	127.2	34	101.1	28	108.4	26	117.2	28	126.6	25	108.0	24
Other fisheries	20.0	20	27.3	24	18.1	25	25.8	25	21.0	18	25.6	17	20.1	18	26.4	14
Chartering, research, or tendering	34.2	11	33.3	11	44.6	13	38.1	15	54.4	15	60.5	22	47.6	22	51.0	15

Table 11.2: Total days at sea by fishery. Total days at sea for EDC vessels (N = number of EDC vessels with non-zero, non-NA responses). The Other fisheries category includes salmon, tuna, halibut, and groundfish caught without a limited entry permit.

Activity	2009		2010		2011		2012		2013		2014		2015		2016	
	Total	N	Total	N	Total	N	Total	N	Total	N	Total	N	Total	N	Total	N
At-sea Pacific whiting	398	19	629	21	711	18	676	16	701	18	804	19	622	14	1,221	16
Shoreside Pacific whiting	933	34	1,388	35	1,376	26	1,341	25	1,407	24	1,612	25	1,261	22	1,467	23
Non-whiting midwater trawl	0	0	0	0	0	0	49	5	75	5	35	9	156	12	102	9
DTS trawl with trawl endorsement	5,496	99	4,787	91	2,888	63	2,319	58	2,546	58	1,978	51	1,709	51	1,646	50
Non-whiting, non-DTS trawl with trawl endorsement	1,756	78	973	52	880	43	1,202	45	1,245	42	1,250	49	1,121	36	1,146	46
Groundfish fixed gear with trawl endorsement	124	5	308	6	756	24	853	26	344	15	557	16	551	17	554	18
Groundfish fixed gear with fixed gear endorsement	149	4	71	3	160	8	254	10	275	9	487	9	265	10	346	9
Crab	2,536	56	2,271	57	2,490	65	2,434	61	2,687	64	2,291	58	1,342	50	2,120	58
Shrimp	977	31	1,327	36	1,775	41	1,812	39	1,645	36	2,359	41	3,212	46	2,079	36
Alaska	3,157	31	3,446	31	4,323	34	2,832	28	2,820	26	3,282	28	3,165	25	2,591	24
Other fisheries	400	20	654	24	452	25	645	25	378	18	435	17	362	18	369	14
Chartering, research, or tendering	377	11	366	11	580	13	571	15	817	15	1,331	22	1,046	22	766	15

11.1 Vessel participation in multiple fisheries

A key characteristic of vessels on the West Coast is participation in multiple fisheries. In 2016, only 11% of all entities participated in just one fishery. There are several reasons why a vessel would participate in multiple fisheries. These reasons include maintaining employment throughout different seasonal fisheries and diversification of participation to protect individuals or communities from variability in the abundance of target species. Table 11.3 and Figures 43 - 49 provide additional insight into the portfolio of fisheries in which vessels participate.

Table 11.3: Participation in multiple fisheries. Number of entities that participated in one or more fisheries by year (N = number of entities, % = percent of total entities in survey year. An entity is defined as a unique combination of an owner or lessee and vessel, whereas a vessel refers to all activities related to that vessel, regardless of the number individuals who owned or leased the vessel).

Number of fisheries	2009		2010		2011		2012		2013		2014		2015		2016	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
1	8	6%	7	5%	14	10%	15	11%	10	8%	16	12%	13	11%	13	11%
2	38	29%	45	35%	50	36%	44	34%	49	40%	50	38%	47	38%	32	28%
3	49	37%	49	38%	46	34%	46	35%	42	34%	36	27%	39	32%	41	36%
4	28	21%	21	16%	21	15%	19	15%	16	13%	24	18%	17	14%	19	17%
4+	9	7%	8	6%	6	4%	7	5%	7	6%	5	4%	7	6%	9	8%

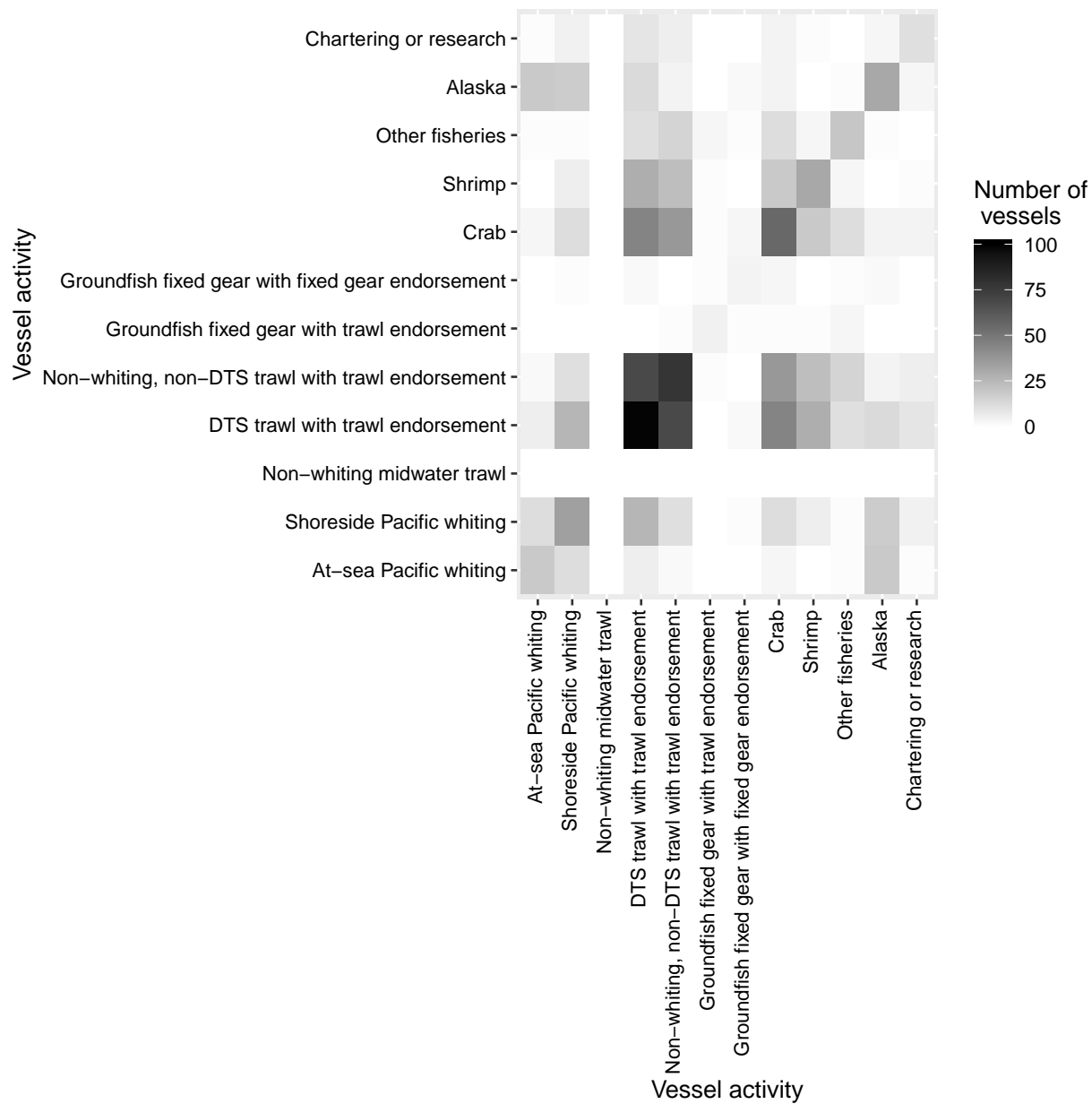


Figure 43: Participation in multiple fisheries - 2009. Frequency of participation in multiple fisheries during 2009 fiscal year.

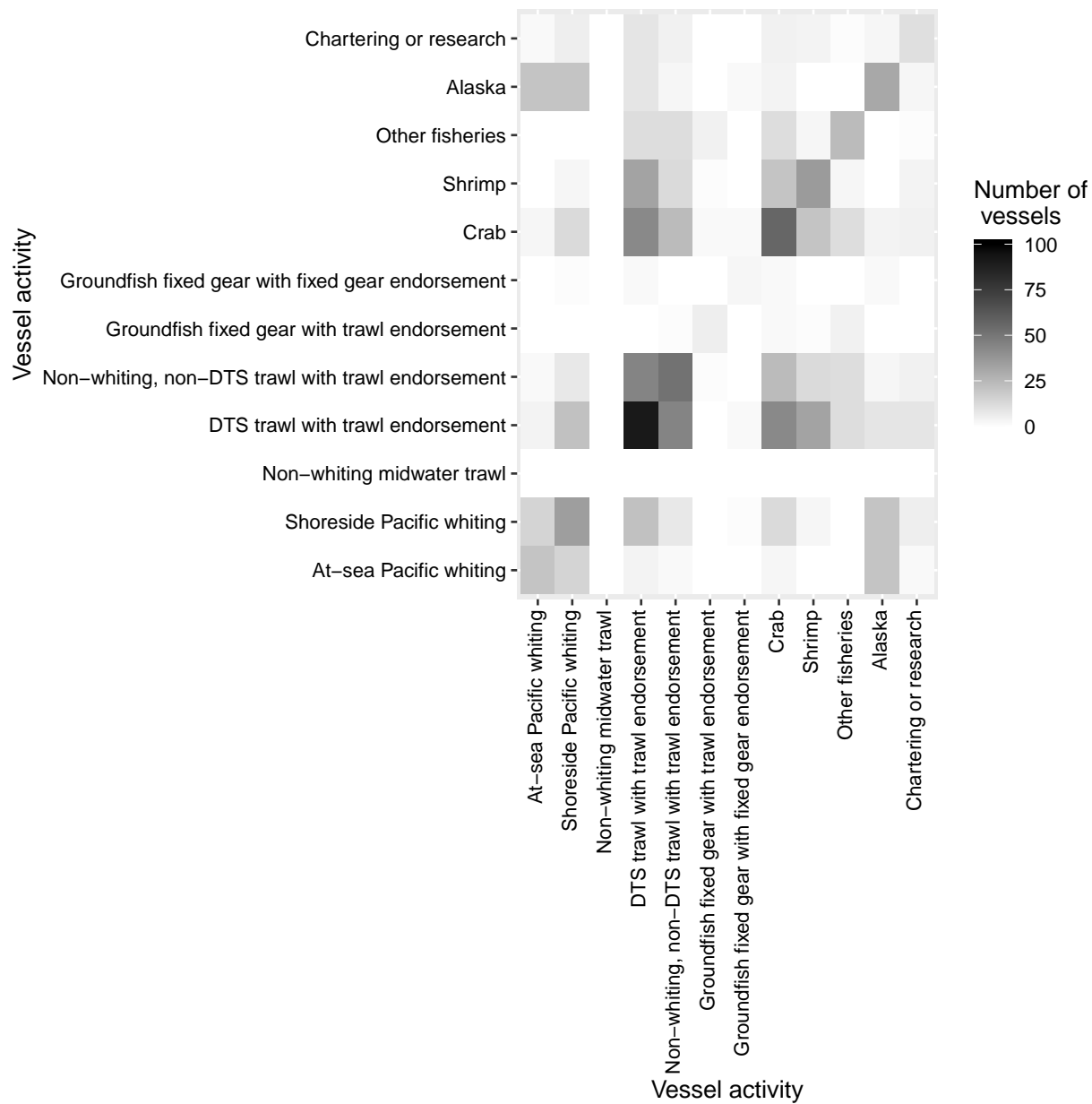


Figure 44: Participation in multiple fisheries - 2010. Frequency of participation in multiple fisheries during 2010 fiscal year.

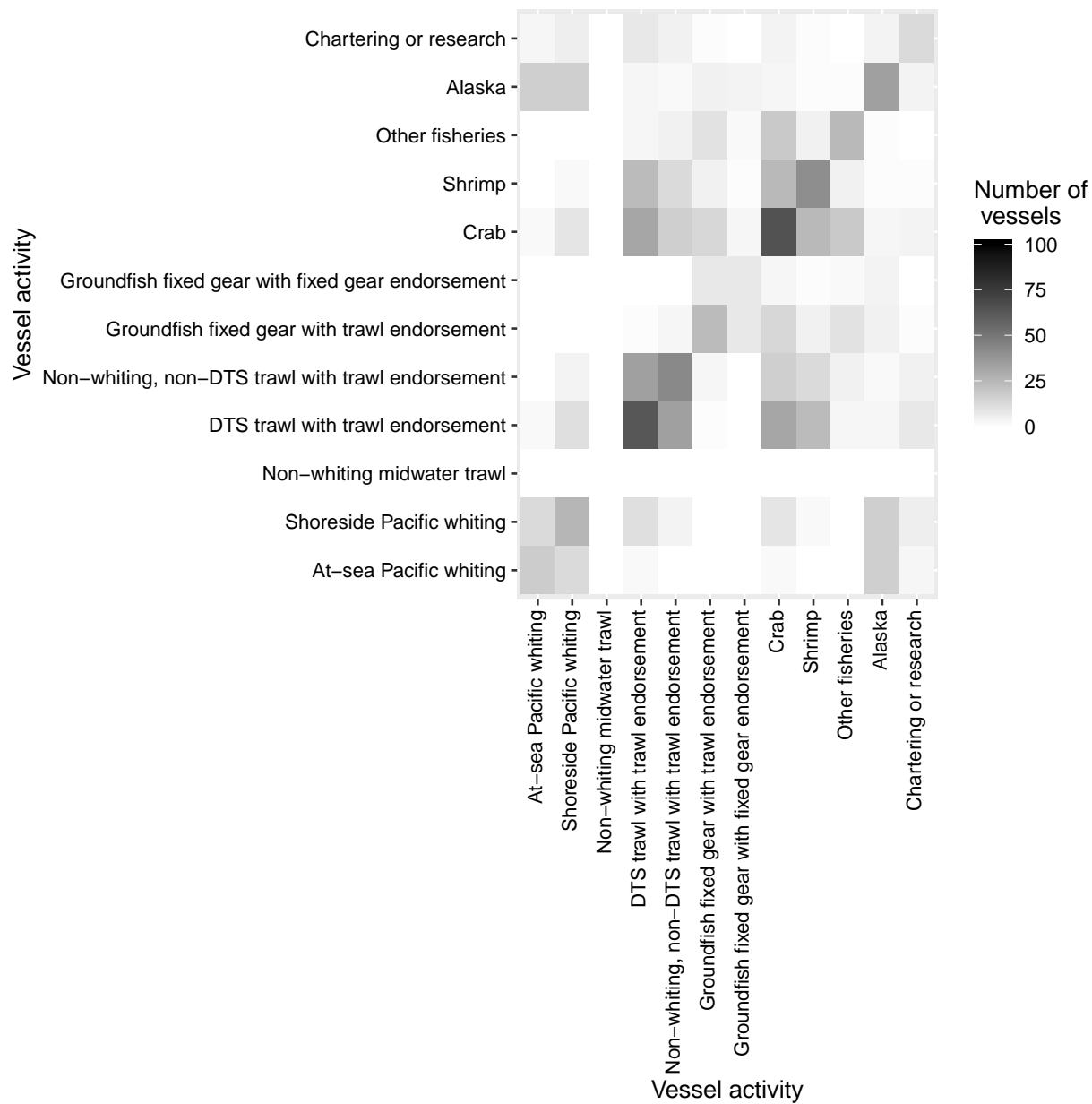


Figure 45: Participation in multiple fisheries - 2011. Frequency of participation in multiple fisheries during 2011 fiscal year.

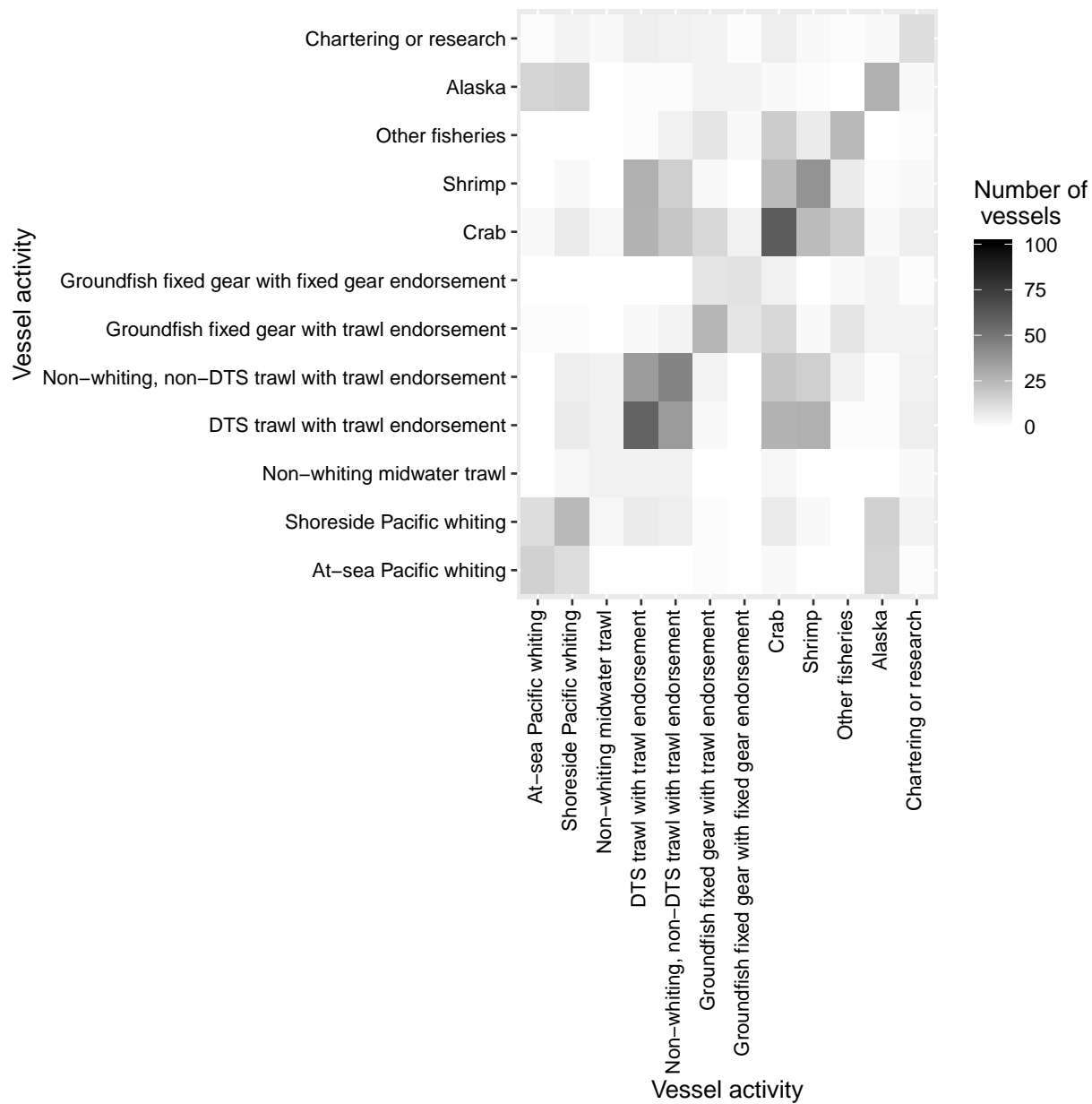


Figure 46: Participation in multiple fisheries - 2012. Frequency of participation in multiple fisheries during 2012 fiscal year.

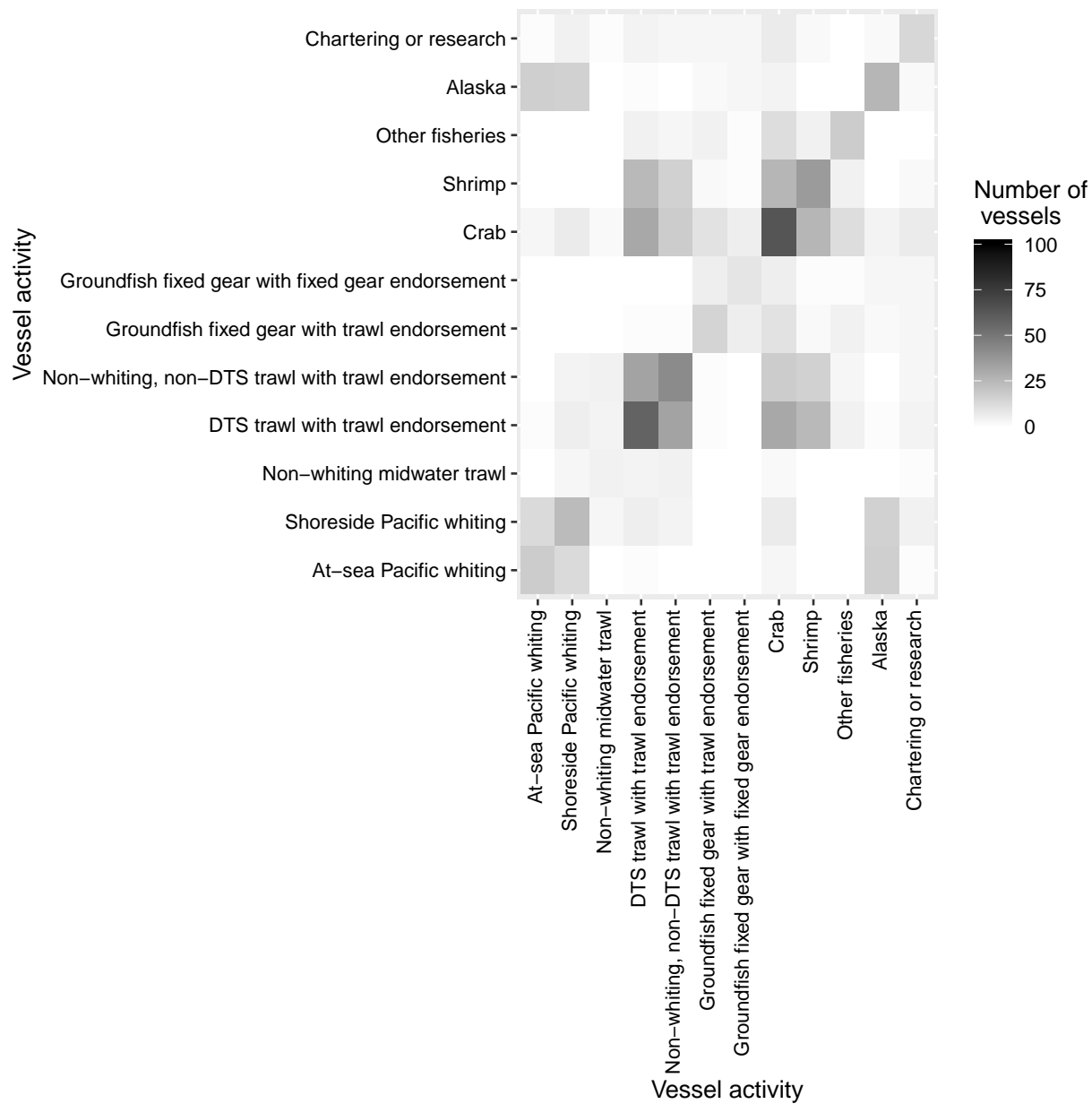


Figure 47: Participation in multiple fisheries - 2013. Frequency of participation in multiple fisheries during 2013 fiscal year.

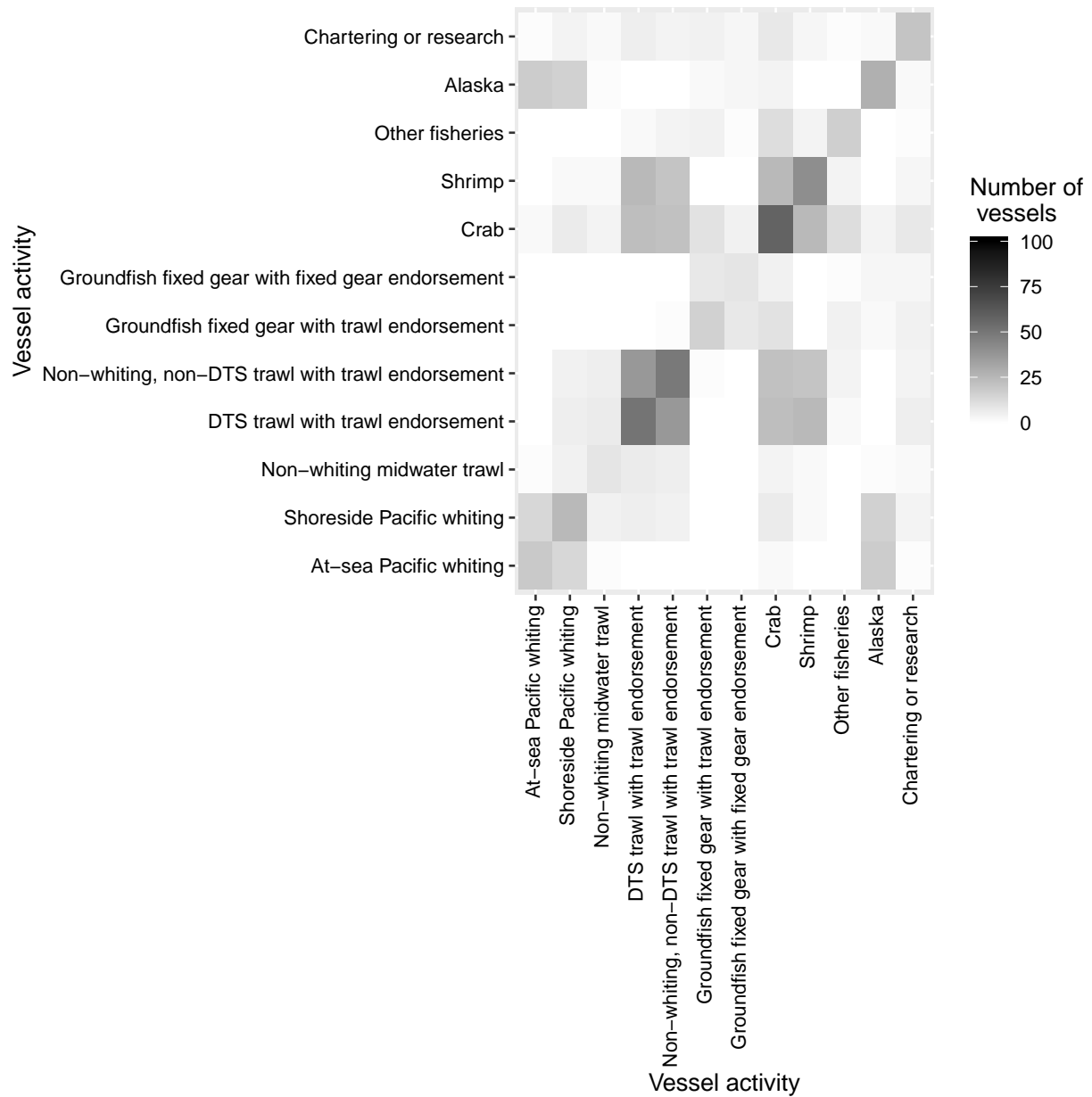


Figure 48: Participation in multiple fisheries - 2014. Frequency of participation in multiple fisheries during 2014 fiscal year.

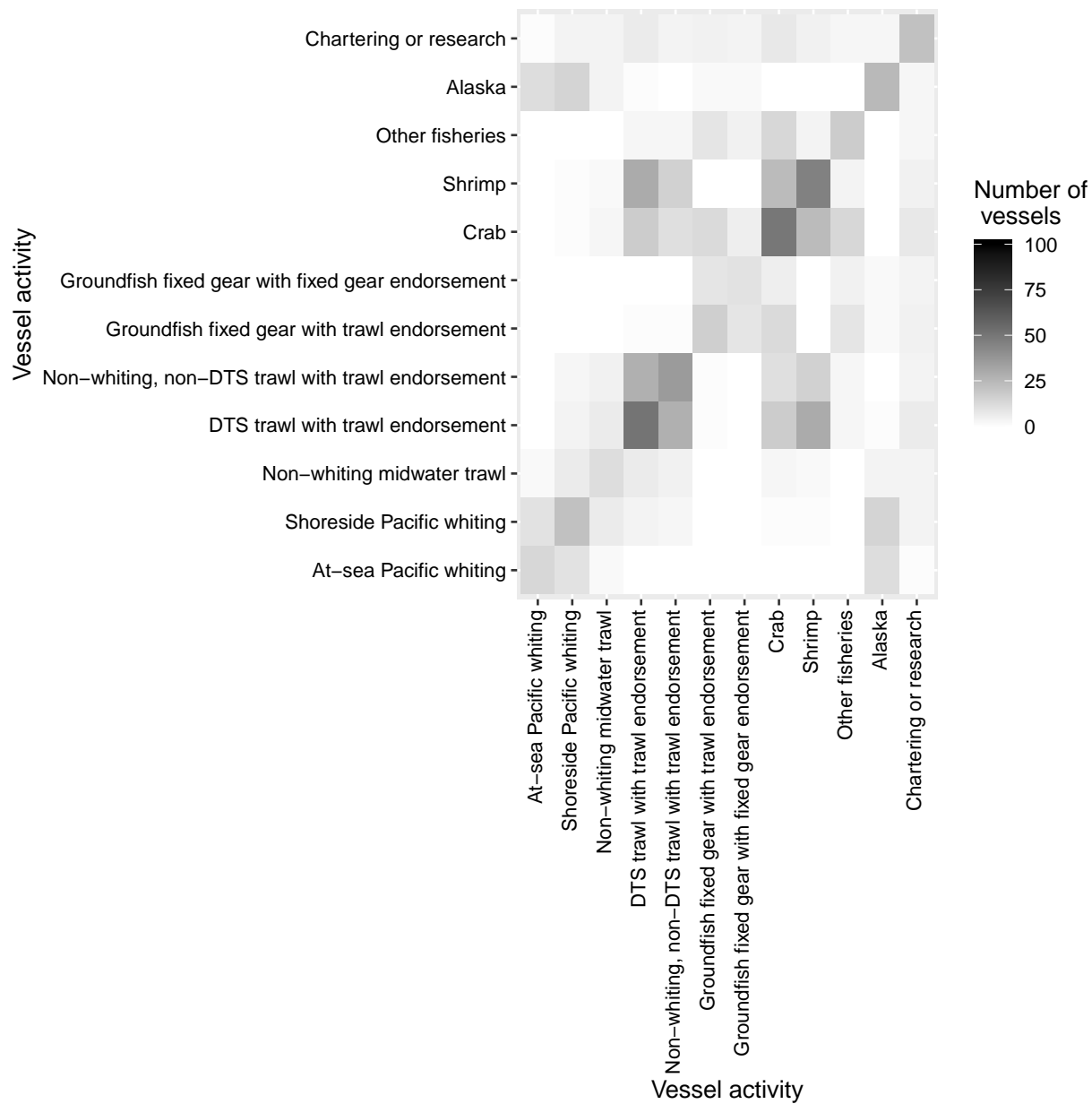


Figure 49: Participation in multiple fisheries - 2015. Frequency of participation in multiple fisheries during 2015 fiscal year.

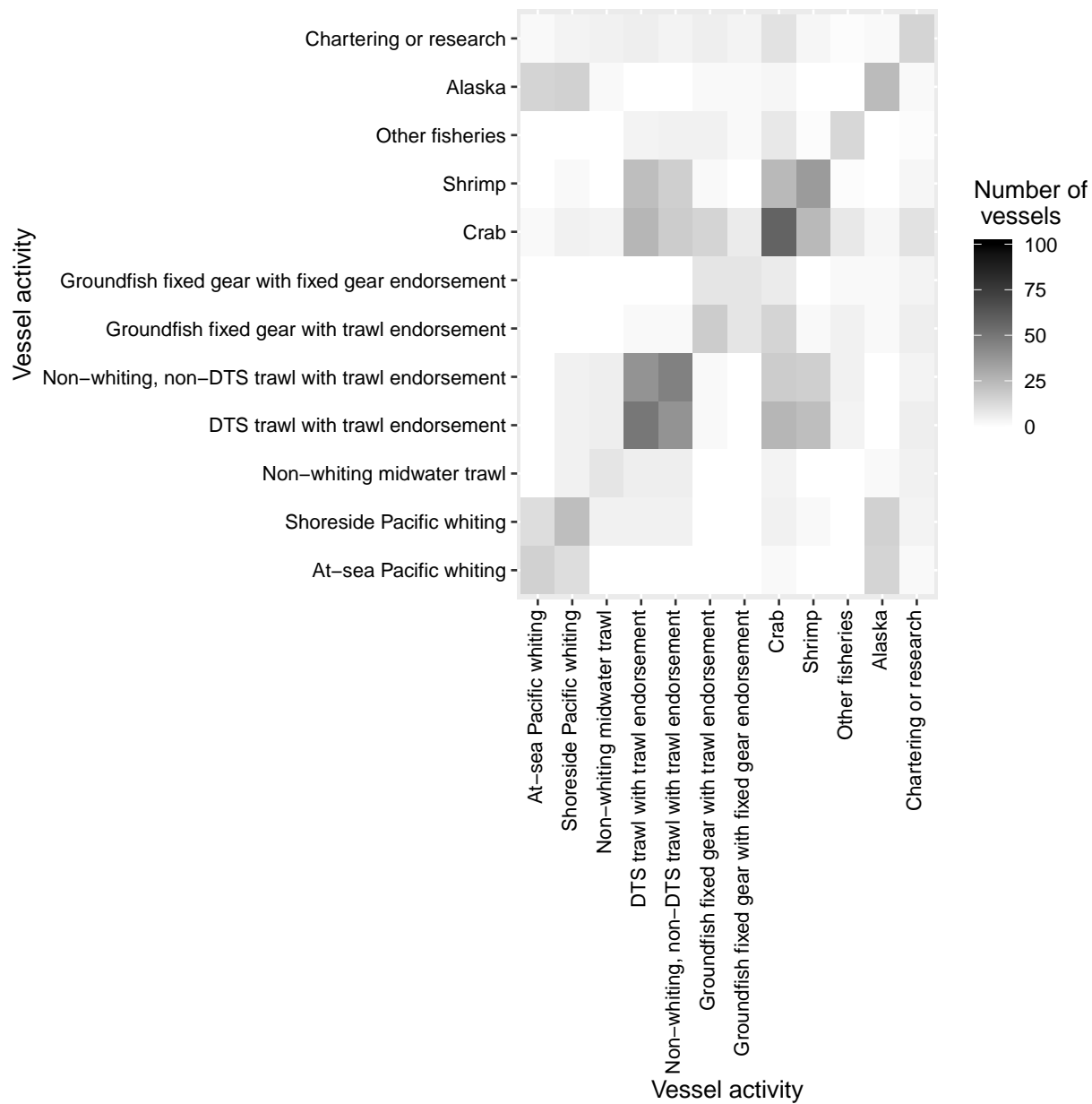


Figure 50: Participation in multiple fisheries - 2016. Frequency of participation in multiple fisheries during 2016 fiscal year.

12 Cost Disaggregation

It is important to conduct economic analyses of specific fisheries. Many vessels and processors that participate in the catch share program also participate in other fisheries, including fishing in Alaska. In order to perform analysis at the West Coast, the catch share program, or fishery level, costs must be broken out by fishery. However, EDC participants incur several types of costs that are aggregated across all fisheries. These are called “joint” costs in the economics and accounting literature and include fixed costs (e.g., new vessel equipment), or variable costs (e.g., fuel). The former are joined by the nature of the costs themselves, while the latter are often joined due to observational limitations. It is difficult to assign fixed costs to a particular fishery because the level of the cost does not vary with business activity (at least over the short run). Many variable costs can theoretically be tracked by fishery, but it would be difficult or costly to do so. For example, although an EDC participant could theoretically set up a system to track expenditures on fuel by fishery, doing so would be costly.

Vessels report variable costs for West Coast activities only, but report fixed costs for all activities (including Alaska). The following sections report the fixed costs that have been allocated using cost disaggregation to West Coast activities (removing the portion of costs that have been allocated to Alaska activities).

12.1 West Coast portion of fixed costs

Table 12.1: All West Coast fixed costs. All fixed costs (thousands of \$) on the West Coast (N = number of EDC vessels with non-zero, non-NA responses).

Expense	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Vessel and on-board equipment	\$101.4:	137	\$90.0:	131	\$135.0:	127	\$151.3:	127	\$154.2:	112	\$171.4:	99	\$100.9:	105	\$105.2:	103
Fishing gear	\$48.5:	141	\$54.7:	132	\$92.5:	136	\$89.3:	128	\$71.0:	88	\$53.7:	71	\$51.3:	78	\$58.1:	72
Processing equipment	\$20.5:	15	\$25.6:	9	\$12.5:	9	\$10.4:	4	\$2.1:	5	***	***	\$0.7:	3	\$39.7:	3
Insurance	\$24.6:	131	\$24.5:	127	\$26.7:	125	\$28.7:	121	\$31.7:	114	\$32.9:	115	\$34.5:	113	\$38.3:	110
Lease of vessel	\$22.4:	12	\$47.1:	10	\$38.1:	10	\$30.9:	7	\$26.8:	7	\$41.7:	7	\$70.4:	8	\$78.5:	10
Moorage	\$3.7:	141	\$4.0:	132	\$4.4:	134	\$5.1:	127	\$5.3:	119	\$5.6:	119	\$5.8:	116	\$6.0:	112
Average total	\$170.4:	147	\$166.7:	140	\$240.5:	142	\$261.3:	134	\$225.5:	124	\$207.5:	123	\$164.4:	120	\$177.8:	117

Table 12.2: Summary of costs on the West Coast. Average capitalized expenditures and expenses (thousands of \$) on vessel and on-board equipment, fishing gear, and processing equipment, other fixed costs, and all variable costs on the West Coast (N = number of EDC vessels with non-zero, non-NA responses).

Category	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Total costs on vessel and on-board equipment, fishing gear, and processing equipment	\$93.0	143	\$99.0	136	\$155.7	134	\$164.9	129	\$150.1	115	\$139.8	109	\$98.7	111	\$106.9	106
Total variable costs	\$211.3	144	\$247.9	138	\$357.3	135	\$376.5	129	\$441.4	120	\$459.6	120	\$388.6	117	\$407.2	114
Total other fixed costs	\$27.9	144	\$29.8	138	\$32.0	135	\$33.8	128	\$36.9	120	\$39.5	120	\$43.9	117	\$49.7	114
Taxes and fees	\$15.9	143	\$18.7	139	\$30.0	119	\$28.2	112	\$33.8	108	\$51.7	108	\$38.8	99	\$47.6	101
Average total costs	\$347.3	144	\$388.5	140	\$566.1	136	\$599.4	129	\$652.5	120	\$672.6	120	\$558.9	117	\$598.5	114

13 Net Economic Benefits

The level of net benefits generated by fishery participants indicates whether an operation is a viable ongoing business, but there are numerous ways to calculate and assess net benefits depending on the data available, including *economic profit*¹ and *net revenue*. Economic profit is an indicator of the long-term viability of fishery operations since it encapsulates all costs, including the opportunity cost of non-cash inputs, and can be used to estimate whether there are incentives or disincentives to invest in capital or enter and leave the fishery. However, calculations of economic profit are beyond the scope of these reports because the EDC Program does not collect information on opportunity costs.

The EDC Program calculates a monetary, financial measure of a participant's net cash flow by subtracting monetary costs from gross revenue, which we call net revenue. The only costs that are included are those that are actually paid or associated with a financial transaction. Net revenue therefore measures the annual financial well-being of a participant's operation and can be used to assess how changes in fishery management may affect monetary gains or losses.

Net revenue is calculated two ways: using only variable costs, and using variable costs plus fixed costs (total costs).² The first calculation is called variable cost net revenue, while the second is called total cost net revenue (Figure 51). Variable cost net revenue is useful for examining changes in fishery operations that likely do not affect fixed costs. For example, the cost of processing an additional metric ton of fish is most representative of the true costs when only variable costs are considered. Total cost net revenue is generally a better measure of financial gain or loss for an entire year, season, or fishery.

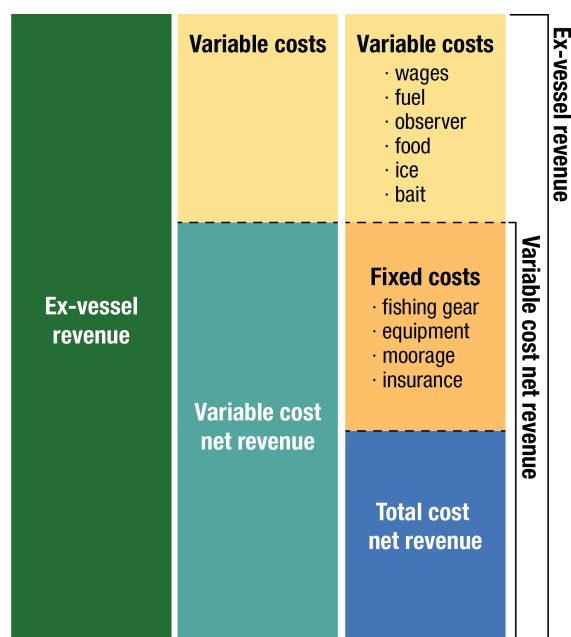


Figure 51: Composition and derivation of variable and total cost net revenue used in the EDC Program analysis of revenue, costs, and economic performance.

There are two caveats associated with the net revenue calculations in this report. First, as noted in Section 4, there are certain costs associated with operating a vessel that are not requested on the EDC

form either because it is difficult to determine the share of the cost associated with the vessel, because costs pertain to items used for activities other than catching or processing fish, or are too difficult to allocate to a particular vessel in a multi-vessel company. These costs include office space, vehicles and transport trucks, storage of equipment, professional fees, and income taxes. Therefore, the net revenue presented here is likely an overestimate of true net revenue.

¹ Whitmarsh D., James C., Pickering H., Neiland A. 2000. The profitability of marine commercial fisheries: a review of economic information needs with particular reference to the UK. *Marine Policy*, Vol. 24(3), pp. 257-263.

² See Section 9 for a more complete discussion of variable and fixed costs used in this report.

Second, the EDC forms do not collect information about financing costs of large purchases and investments. Instead of using principal and interest payment information in calculations of net revenue, we therefore must use the total costs associated with the purchases, repair, maintenance, or improvements. For example, if a new engine is purchased, the total cost of the engine is used in the year that it was reported even though the actual cash outlay, if it were financed, would only be the principal and interest payments. It is likely that many larger capital costs, and perhaps some operating costs, are financed. This would mean that the actual cash outlays in a particular year for those items would be less than what is used in the EDC net revenue calculation. This may largely balance out over time because previously financed capital are also not included. Moreover, total cost net revenue is expected to be representative of actual total cost net revenue only when averaged over many years and across participants because relatively large capital costs only occur periodically.

13.1 Net revenue for all West Coast fishing activities

Average net revenue is calculated for all activities on the West Coast for EDC vessels, and it is reported by fishery for EDC vessels. West Coast revenue includes all revenue from at-sea deliveries and shoreside landings. The variable and fixed costs do not include costs related to acquiring limited entry permits, quota shares, or quota pounds.

$$\text{Variable cost net revenue} = \text{West Coast revenue} - \text{West Coast variable costs}$$

$$\text{Total cost net revenue} = \text{West Coast revenue} - (\text{West Coast variable costs} + \text{West Coast fixed costs})$$

The following pages contain tables and figures depicting revenue, costs, variable cost net revenue, and total cost net revenue for all of the fisheries combined (Table 13.2) and different fishery combinations (Tables 13.3 through 13.16 and Figures 53 through 66), including All West Coast fisheries (only catch share vessels), All West Coast fisheries (all EDC vessels³), Whiting (shoreside and at-sea), All catch share vessels⁴ (whiting and non-whiting groundfish), and Non-whiting catch share groundfish (see Table 13.1 for a list of where to find each of these individual tables).

Table 13.1: Table of contents for net revenue tables. An EDC vessel is defined as any vessel that had a limited entry trawl permit on the vessel in the designated year. A catch share vessel is any vessel that participated in the West Coast Groundfish Trawl Catch Share Program at any time in the designated year.

Fishery	Table
All West Coast fisheries (all EDC vessels)	Table 13.2
All West Coast fisheries (only catch share vessels)	Table 13.3
All catch shares (whiting and non-whiting groundfish)	Table 13.4
Whiting (shoreside and at-sea)	Table 13.5
Non-whiting groundfish (catch shares only)	Table 13.6
At-sea Pacific whiting	Table 13.7
Shoreside Pacific whiting	Table 13.8
Non-whiting midwater trawl	Table 13.9
DTS trawl with trawl endorsement	Table 13.10
Non-whiting, non-DTS trawl with trawl endorsement	Table 13.11
Groundfish fixed gear with trawl endorsement	Table 13.12
Groundfish fixed gear with fixed gear endorsement	Table 13.13
Crab	Table 13.14
Shrimp	Table 13.15
Other fisheries	Table 13.16
All catch shares with quota earnings and costs	Table 13.17
Whiting vessels with quota earnings and costs	Table 13.18
Groundfish vessels with quota earnings and costs	Table 13.19

³ An EDC vessel is defined as any vessel that had a limited entry trawl permit on the vessel in the designated year.

⁴ A catch share vessel is any vessel that participated in the West Coast Groundfish Trawl Catch Share Program at any time in the designated year.

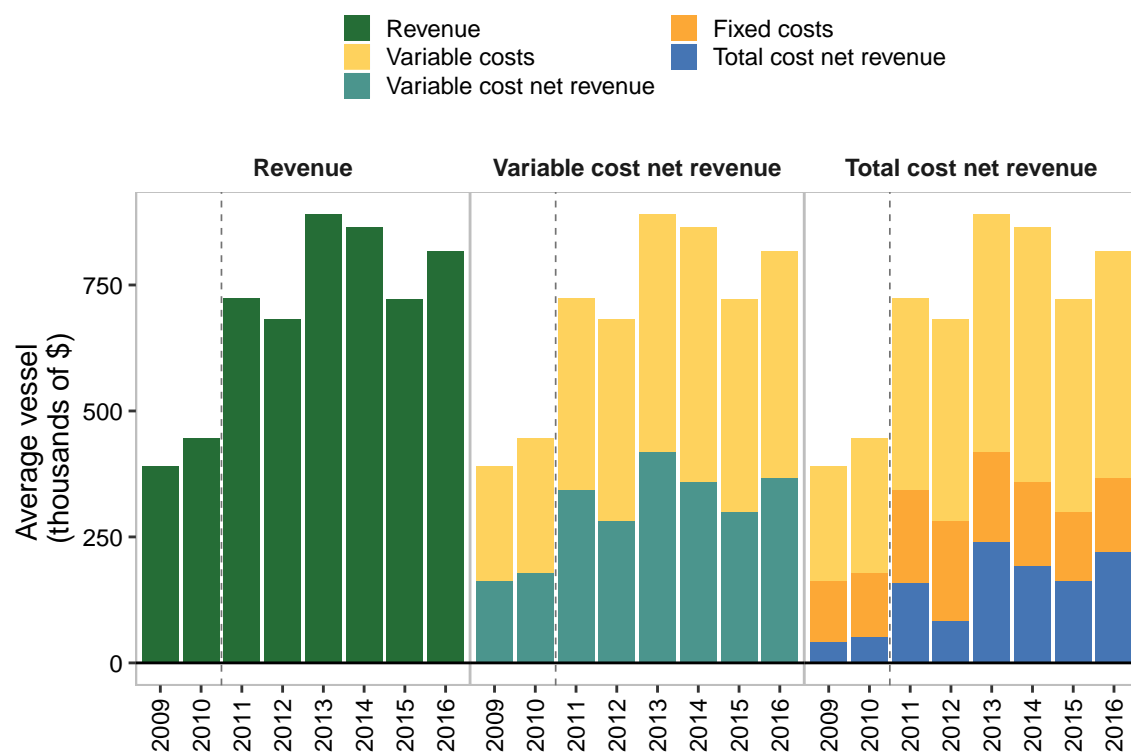


Figure 52: West Coast average variable cost and total cost net revenue for EDC vessels. Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue on the West Coast, for EDC vessels. Dashed line represents the beginning of the catch share program.

Table 13.2: West Coast average variable cost and total cost net revenue for EDC vessels. Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue (thousands of \$) on the West Coast, for all vessels that were required to submit an EDC form (N = number of EDC vessels with non-zero, non-NA responses).

	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Revenue	\$390	144	\$447	138	\$723	136	\$682	129	\$891	120	\$864	120	\$722	117	\$817	114
(Variable costs)	(\$227)	144	(\$267)	138	(\$380)	136	(\$400)	129	(\$471)	120	(\$506)	120	(\$421)	117	(\$449)	114
Variable cost net revenue	\$162	144	\$180	138	\$343	136	\$282	129	\$420	120	\$358	120	\$300	117	\$368	114
(Fixed costs)	(\$120)	144	(\$127)	138	(\$184)	136	(\$198)	129	(\$180)	120	(\$166)	120	(\$137)	117	(\$148)	114
Total cost net revenue	\$42	144	\$53	138	\$159	136	\$84	129	\$240	120	\$192	120	\$163	117	\$220	114

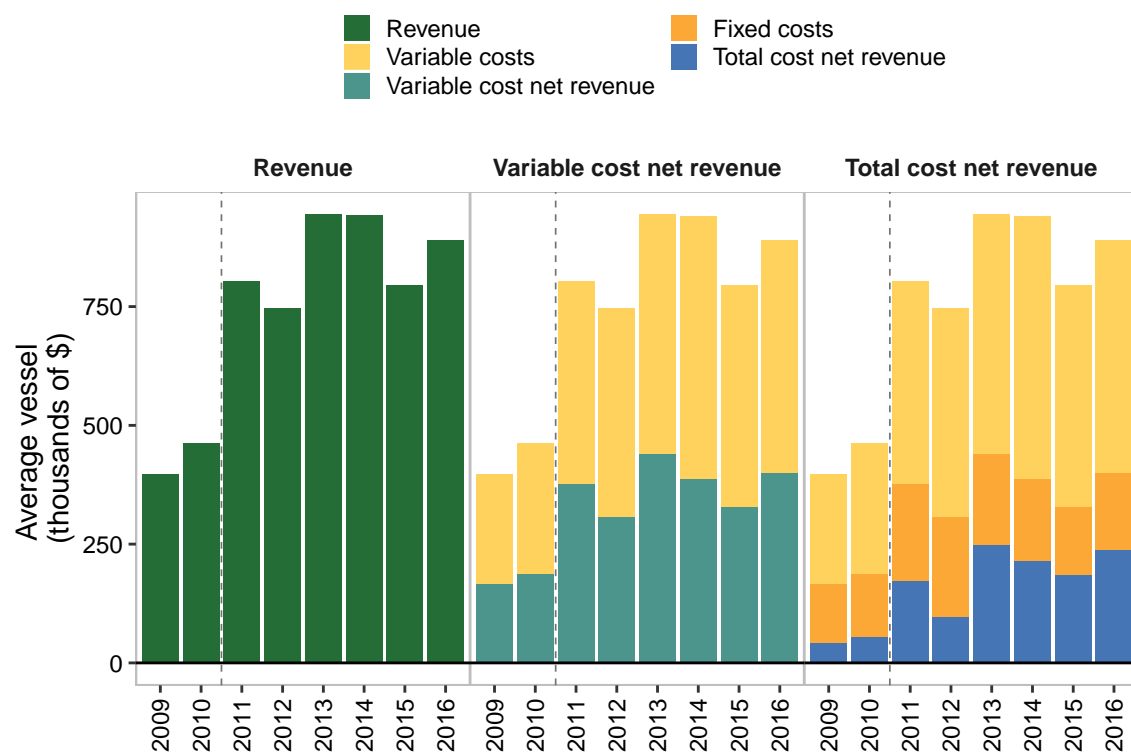


Figure 53: West Coast average variable cost and total cost net revenue for catch share vessels. Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue on the West Coast, only for vessels that participated in the catch share program. Dashed line represents the beginning of the catch share program.

Table 13.3: West Coast average variable cost and total cost net revenue for catch share vessels. Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue (thousands of \$) on the West Coast for only vessels that participated in the catch share program (N = number of EDC vessels with non-zero, non-NA responses).

	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Revenue	\$397	138	\$463	129	\$804	113	\$747	110	\$945	104	\$941	101	\$795	96	\$890	97
(Variable costs)	(\$231)	138	(\$274)	129	(\$427)	113	(\$438)	110	(\$504)	104	(\$553)	101	(\$465)	96	(\$490)	97
Variable cost net revenue	\$166	138	\$189	129	\$377	113	\$309	110	\$441	104	\$388	101	\$330	96	\$400	97
(Fixed costs)	(\$124)	138	(\$133)	129	(\$203)	113	(\$213)	110	(\$193)	104	(\$174)	101	(\$144)	96	(\$161)	97
Total cost net revenue	\$42	138	\$56	129	\$174	113	\$96	110	\$249	104	\$214	101	\$185	96	\$239	97

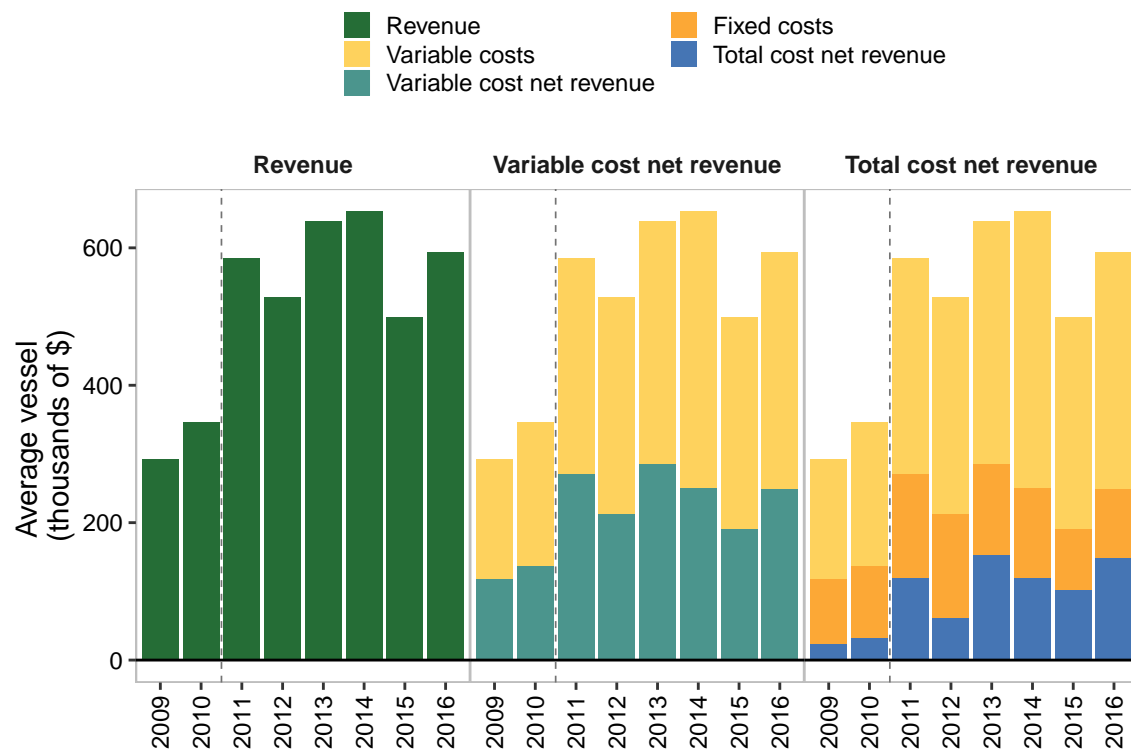


Figure 54: All catch shares (whiting and non-whiting groundfish) average variable cost and total cost net revenue for catch share vessels. Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue for all participation in the catch share (whiting and non-whiting groundfish) fisheries. Dashed line represents the beginning of the catch share program.

Table 13.4: All catch shares (whiting and non-whiting groundfish) average variable cost and total cost net revenue for catch share vessels. Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue (thousands of \$) for all participation in the catch share (whiting and non-whiting groundfish) fisheries (N = number of EDC vessels with non-zero, non-NA responses).

	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Revenue	\$293	138	\$346	129	\$584	113	\$528	110	\$639	104	\$653	101	\$499	96	\$594	97
(Variable costs)	(\$174)	138	(\$208)	129	(\$313)	113	(\$315)	110	(\$353)	104	(\$402)	101	(\$308)	96	(\$344)	97
Variable cost net revenue	\$119	138	\$137	129	\$271	113	\$213	110	\$286	104	\$251	101	\$190	96	\$250	97
(Fixed costs)	(\$95)	138	(\$105)	129	(\$151)	113	(\$150)	110	(\$132)	104	(\$132)	101	(\$88)	96	(\$101)	97
Total cost net revenue	\$24	138	\$32	129	\$120	113	\$62	110	\$154	104	\$120	101	\$102	96	\$149	97

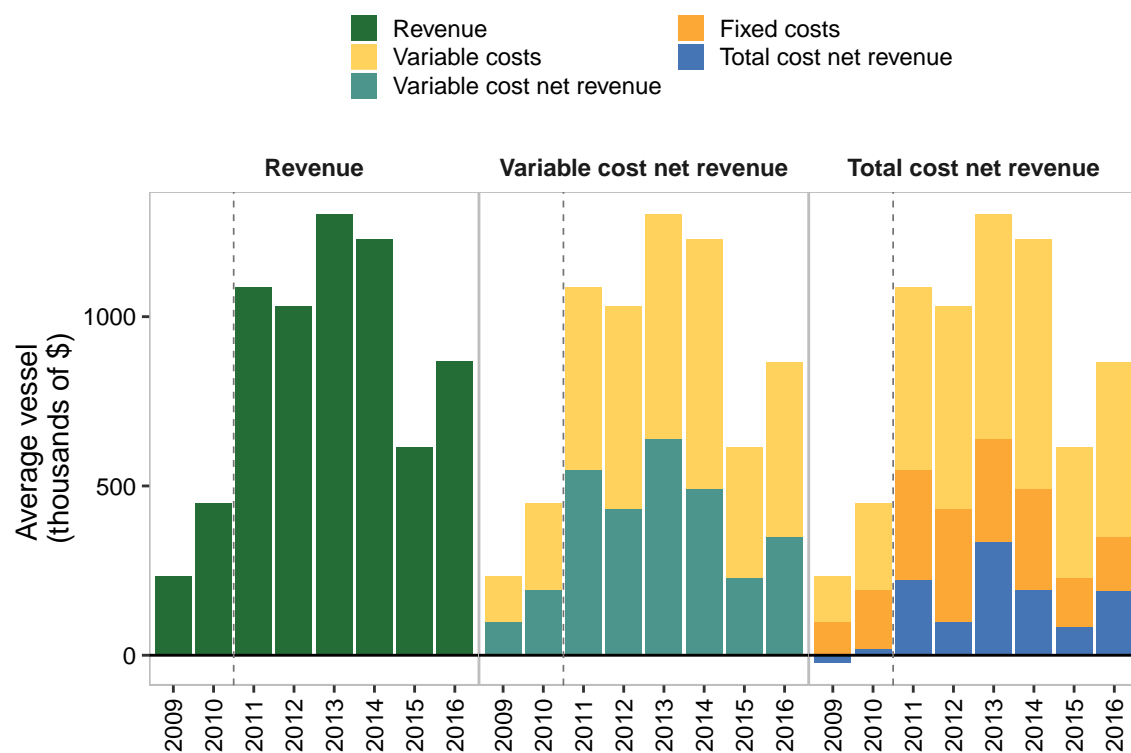


Figure 55: Whiting (shoreside and at-sea) average variable cost and total cost net revenue for catch share vessels. Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue in whiting fisheries (at-sea and shoreside). Dashed line represents the beginning of the catch share program.

Table 13.5: Whiting (shoreside and at-sea) average variable cost and total cost net revenue for catch share vessels. Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue (thousands of \$) for the whiting fisheries (shoreside and at-sea) (N = number of EDC vessels with non-zero, non-NA responses).

	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Revenue	\$234	41	\$450	41	\$1,086	31	\$1,030	29	\$1,303	29	\$1,228	30	\$614	26	\$867	28
(Variable costs)	(\$136)	41	(\$255)	41	(\$539)	31	(\$598)	29	(\$663)	29	(\$737)	30	(\$386)	26	(\$516)	28
Variable cost net revenue	\$99	41	\$195	41	\$547	31	\$432	29	\$641	29	\$491	30	\$228	26	\$351	28
(Fixed costs)	(\$121)	41	(\$176)	41	(\$325)	31	(\$334)	29	(\$304)	29	(\$295)	30	(\$144)	26	(\$162)	28
Total cost net revenue	-\$23	41	\$19	41	\$222	31	\$98	29	\$336	29	\$195	30	\$84	26	\$189	28

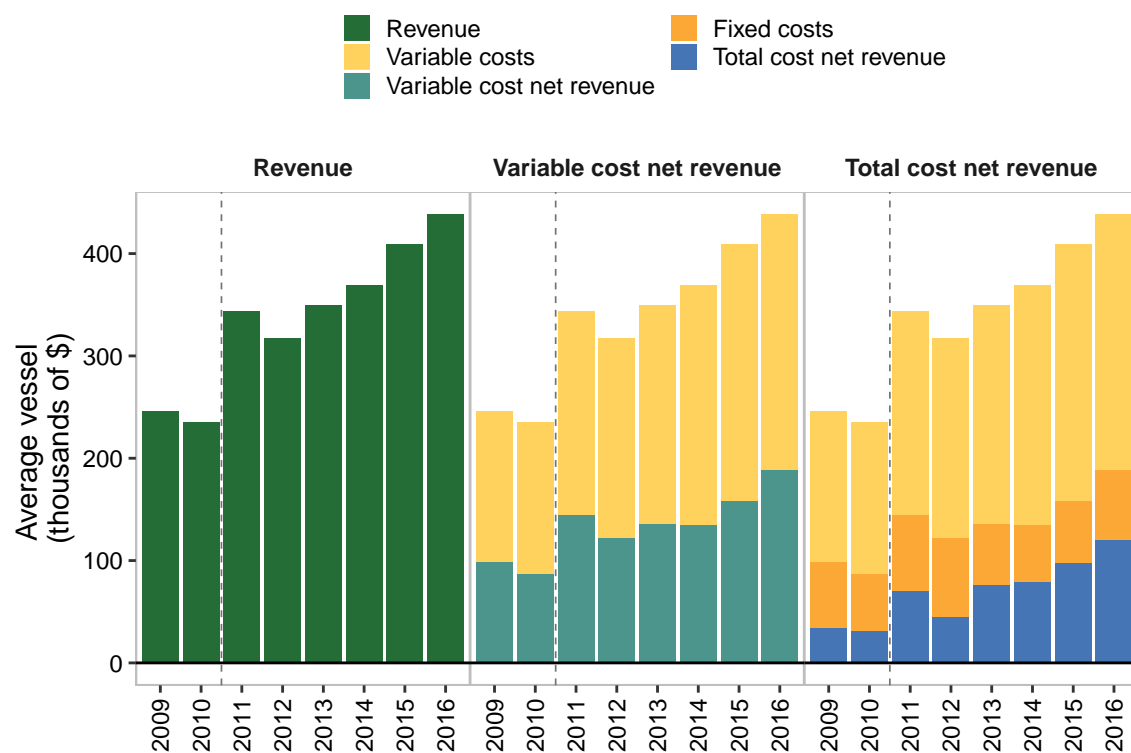


Figure 56: Groundfish (non-whiting) average variable cost and total cost net revenue for catch share vessels. Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue in catch share groundfish fisheries (non-whiting). Dashed line represents the beginning of the catch share program.

Table 13.6: Groundfish (non-whiting) average variable cost and total cost net revenue for catch share vessels. Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue (thousands of \$) in catch share groundfish fisheries (non-whiting) (N = number of EDC vessels with non-zero, non-NA responses).

	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Revenue	\$246	125	\$236	111	\$344	94	\$317	89	\$349	82	\$369	79	\$409	78	\$439	76
(Variable costs)	(\$147)	125	(\$148)	111	(\$198)	94	(\$195)	89	(\$213)	82	(\$234)	79	(\$251)	78	(\$249)	76
Variable cost net revenue	\$99	125	\$87	111	\$145	94	\$122	89	\$136	82	\$135	79	\$158	78	\$189	76
(Fixed costs)	(\$65)	125	(\$57)	111	(\$75)	94	(\$77)	89	(\$60)	82	(\$56)	79	(\$60)	78	(\$69)	76
Total cost net revenue	\$34	125	\$31	111	\$71	94	\$45	89	\$76	82	\$79	79	\$98	78	\$121	76

13.2 Net revenue for West Coast catch share fisheries, crab, shrimp, and other fisheries

Table 13.7: At-sea Pacific whiting fishery average variable cost and total cost net revenue. Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue (thousands of \$) in the At-sea Pacific whiting fishery (N = number of EDC vessels with non-zero, non-NA responses).

	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Revenue	\$220	19	\$402	21	\$619	18	\$560	16	\$624	18	\$660	19	\$397	14	\$626	17
(Variable costs)	(\$115)	19	(\$199)	21	(\$307)	18	(\$365)	16	(\$344)	18	(\$408)	19	(\$229)	14	(\$380)	17
Variable cost net revenue	\$106	19	\$202	21	\$312	18	\$195	16	\$280	18	\$251	19	\$168	14	\$246	17
(Fixed costs)	(\$92)	19	(\$88)	21	(\$185)	18	(\$206)	16	(\$120)	18	(\$153)	19	(\$97)	14	(\$130)	17
Total cost net revenue	\$13	19	\$114	21	\$127	18	-\$11	16	\$160	18	\$98	19	\$71	14	\$117	17

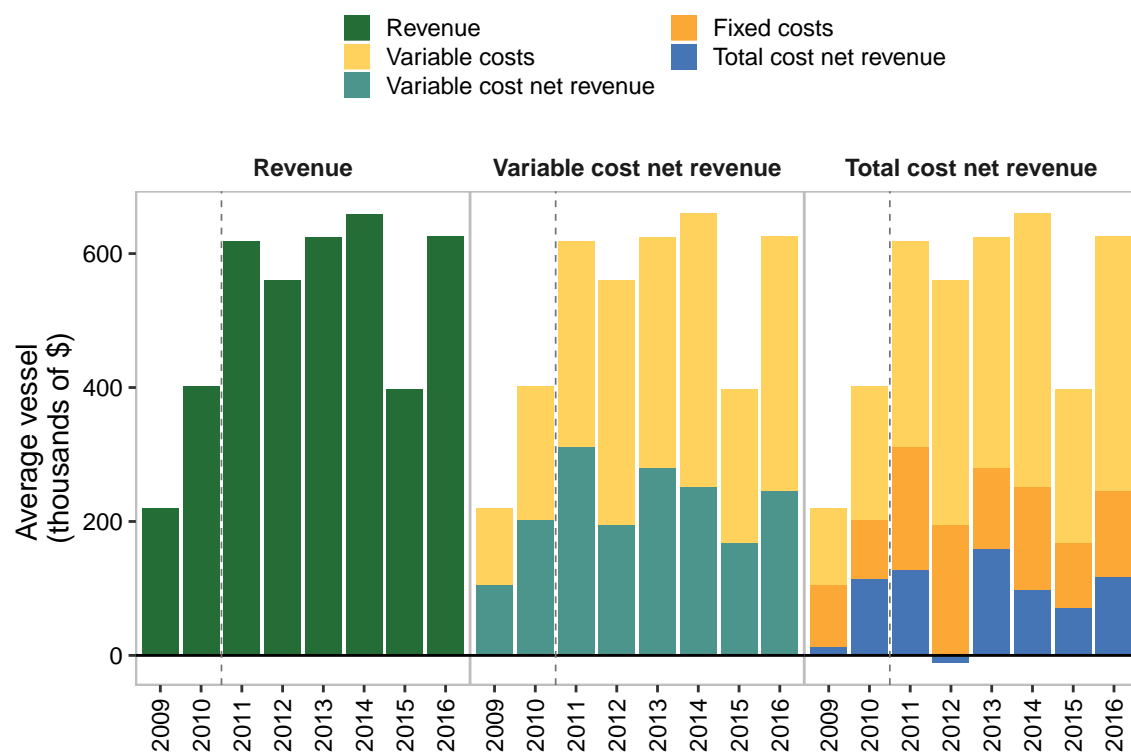


Figure 57: At-sea Pacific whiting fishery variable cost net revenue and total cost net revenue. Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue in the at-sea Pacific whiting fishery. Dashed line represents the beginning of the catch share program.

Table 13.8: Shoreside Pacific whiting fishery average variable cost and total cost net revenue. Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue (thousands of \$) in the Shoreside Pacific whiting fishery (N = number of EDC vessels with non-zero, non-NA responses).

	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Revenue	\$160	34	\$286	35	\$867	26	\$836	25	\$1,107	24	\$972	25	\$473	22	\$593	23
(Variable costs)	(\$100)	34	(\$179)	35	(\$431)	26	(\$460)	25	(\$542)	24	(\$574)	25	(\$311)	22	(\$348)	23
Variable cost net revenue	\$60	34	\$107	35	\$436	26	\$376	25	\$565	24	\$398	25	\$162	22	\$245	23
(Fixed costs)	(\$95)	34	(\$154)	35	(\$259)	26	(\$255)	25	(\$278)	24	(\$238)	25	(\$108)	22	(\$101)	23
Total cost net revenue	-\$35	34	-\$47	35	\$177	26	\$121	25	\$287	24	\$160	25	\$54	22	\$144	23

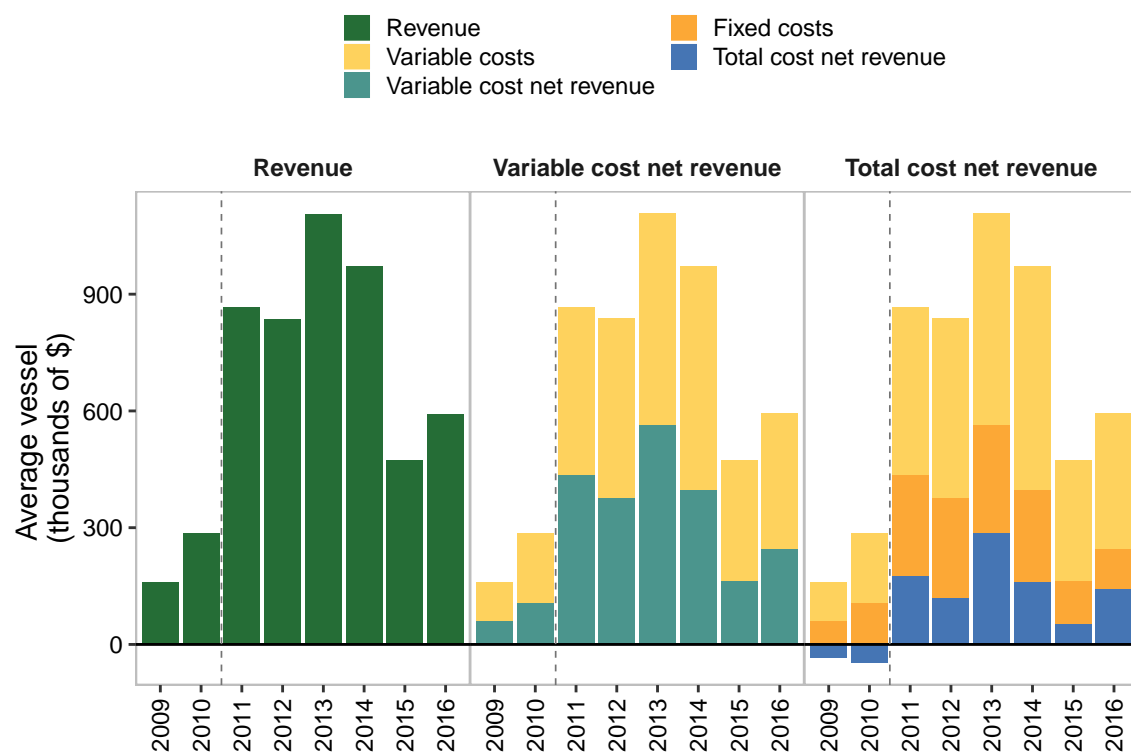


Figure 58: Shoreside Pacific whiting fishery variable cost net revenue and total cost net revenue. Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue in the shoreside Pacific whiting fishery. Dashed line represents the beginning of the catch share program.

Table 13.9: Non-whiting midwater trawl fishery average variable cost and total cost net revenue. Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue (thousands of \$) in the Non-whiting midwater trawl fishery (N = number of EDC vessels with non-zero, non-NA responses).

			2009		2010		2011		2012		2013		2014		2015		2016	
			Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Revenue			—	—	—	—	—	—	\$56	5	\$134	5	\$100	9	\$142	12	\$148	9
(Variable costs)			—	—	—	—	—	—	(\$34)	5	(\$71)	5	(\$57)	9	(\$81)	12	(\$79)	9
Variable	cost	net	—	—	—	—	—	—	\$22	5	\$63	5	\$44	9	\$61	12	\$69	9
(Fixed costs)			—	—	—	—	—	—	(\$7)	5	(\$18)	5	(\$42)	9	(\$21)	12	(\$23)	9
Total cost net revenue			—	—	—	—	—	—	\$15	5	\$45	5	\$2	9	\$40	12	\$46	9

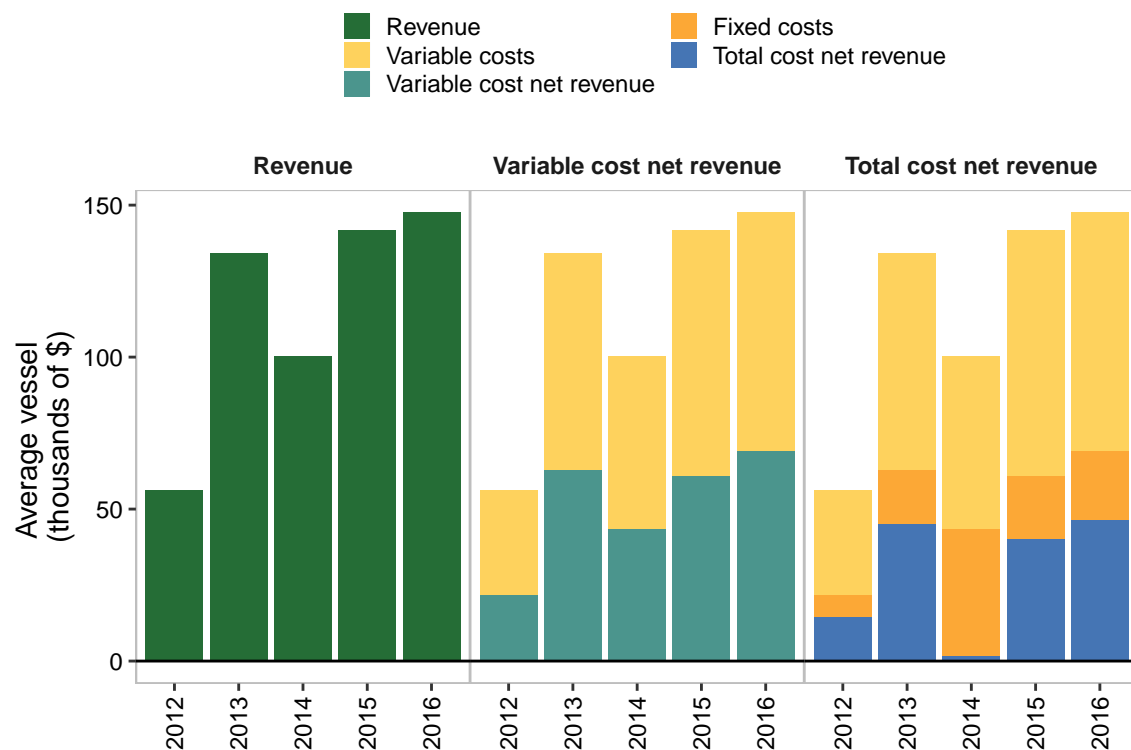


Figure 59: Non-whiting midwater trawl fishery variable cost net revenue and total cost net revenue. Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue in the Non-whiting midwater trawl. Vessels did not begin targeting non-whiting groundfish with midwater trawl gear until 2012. Dashed line represents the beginning of the catch share program.

Table 13.10: DTS trawl with trawl endorsement fishery average variable cost and total cost net revenue. Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue (thousands of \$) in the DTS trawl with trawl endorsement fishery (N = number of EDC vessels with non-zero, non-NA responses).

	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Revenue	\$241	108	\$232	96	\$315	63	\$266	58	\$291	58	\$301	51	\$323	51	\$329	50
(Variable costs)	(\$140)	108	(\$147)	96	(\$188)	63	(\$167)	58	(\$181)	58	(\$195)	51	(\$199)	51	(\$192)	50
Variable cost net revenue	\$102	108	\$85	96	\$126	63	\$99	58	\$110	58	\$107	51	\$124	51	\$137	50
(Fixed costs)	(\$63)	108	(\$56)	96	(\$58)	63	(\$64)	58	(\$52)	58	(\$49)	51	(\$48)	51	(\$55)	50
Total cost net revenue	\$39	108	\$29	96	\$68	63	\$35	58	\$58	58	\$57	51	\$75	51	\$82	50

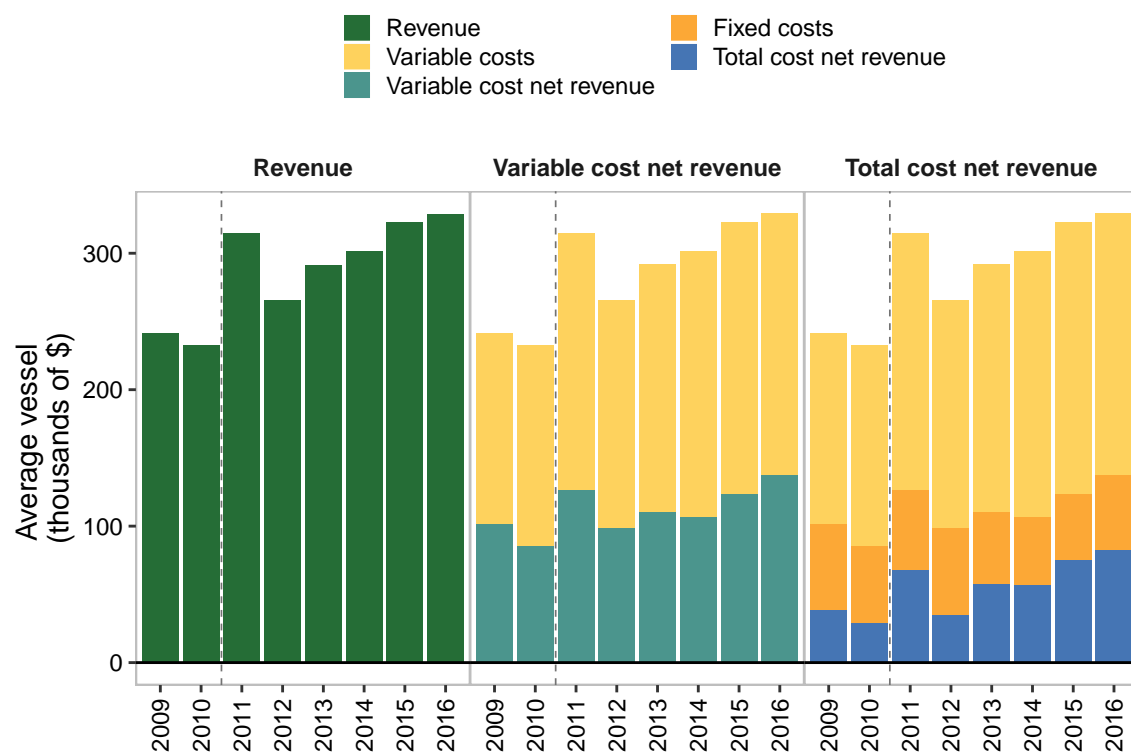


Figure 60: DTS trawl with trawl endorsement fishery variable cost net revenue and total cost net revenue. Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue in the DTS trawl with trawl endorsement fishery. Dashed line represents the beginning of the catch share program.

Table 13.11: Non-whiting, non-DTS trawl with trawl endorsement fishery average variable cost and total cost net revenue. Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue (thousands of \$) in the Non-whiting, non-DTS trawl with trawl endorsement fishery (N = number of EDC vessels with non-zero, non-NA responses).

	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Revenue	\$49	89	\$47	57	\$116	42	\$166	45	\$194	43	\$173	49	\$236	36	\$194	47
(Variable costs)	(\$35)	89	(\$32)	57	(\$72)	43	(\$102)	45	(\$119)	43	(\$113)	49	(\$146)	36	(\$112)	47
Variable cost net revenue	\$14	89	\$15	57	\$41	43	\$63	45	\$75	43	\$60	49	\$89	36	\$82	47
(Fixed costs)	(\$14)	89	(\$13)	57	(\$20)	43	(\$32)	45	(\$27)	43	(\$18)	49	(\$28)	36	(\$31)	47
Total cost net revenue	-\$0	89	\$2	57	\$22	43	\$31	45	\$48	43	\$42	49	\$62	36	\$50	47

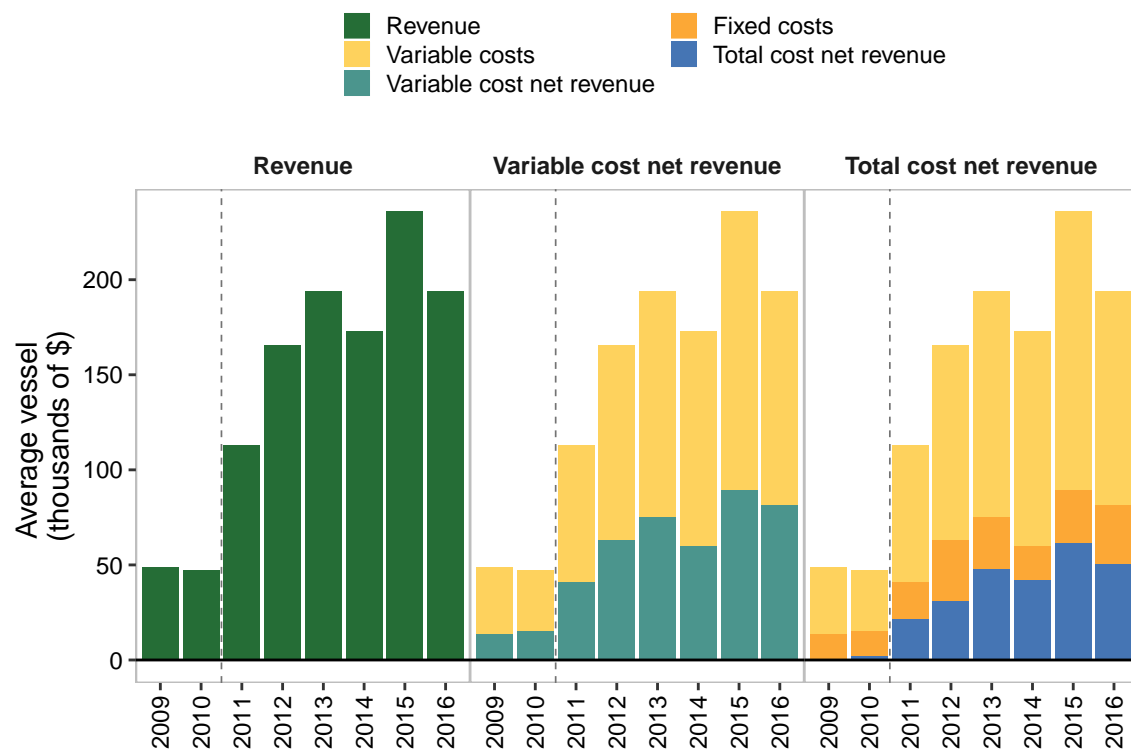


Figure 61: Non-whiting, non-DTS trawl with trawl endorsement fishery variable cost net revenue and total cost net revenue. Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue in the non-whiting, non-DTS trawl with trawl endorsement fishery. Dashed line represents the beginning of the catch share program.

Table 13.12: Groundfish fixed gear with trawl endorsement fishery average variable cost and total cost net revenue.
Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue (thousands of \$) in the Groundfish fixed gear with trawl endorsement fishery (N = number of EDC vessels with non-zero, non-NA responses).

	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Revenue	\$50	8	\$142	8	\$306	25	\$195	26	\$180	15	\$277	16	\$309	17	\$339	19
(Variable costs)	(\$24)	8	(\$63)	8	(\$148)	25	(\$112)	26	(\$103)	15	(\$157)	16	(\$187)	17	(\$178)	19
Variable cost net revenue	\$26	8	\$79	8	\$157	25	\$83	26	\$77	15	\$119	16	\$122	17	\$162	19
(Fixed costs)	(\$19)	8	(\$21)	8	(\$100)	25	(\$64)	26	(\$39)	15	(\$42)	16	(\$57)	17	(\$43)	19
Total cost net revenue	\$7	8	\$58	8	\$57	25	\$19	26	\$38	15	\$77	16	\$65	17	\$119	19

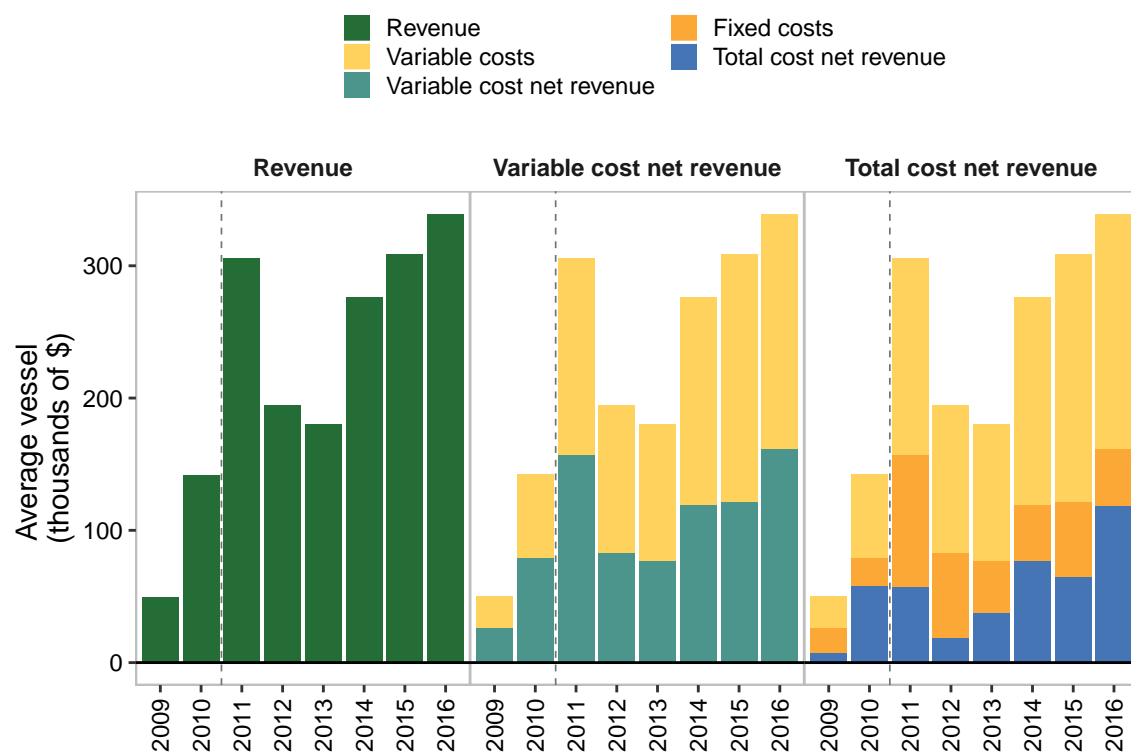


Figure 62: Groundfish fixed gear with trawl endorsement fishery variable cost net revenue and total cost net revenue. Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue in the groundfish fixed gear with trawl endorsement fishery.

Table 13.13: Groundfish fixed gear with fixed gear endorsement fishery average variable cost and total cost net revenue. Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue (thousands of \$) in the Groundfish fixed gear with fixed gear endorsement fishery (N = number of EDC vessels with non-zero, non-NA responses).

	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Revenue	\$214	4	\$254	3	\$221	9	\$162	10	\$162	9	\$202	9	\$240	10	\$297	10
(Variable costs)	(\$141)	4	(\$190)	3	(\$87)	9	(\$93)	10	(\$99)	9	(\$110)	9	(\$141)	10	(\$135)	10
Variable cost net revenue	\$74	4	\$64	3	\$134	9	\$69	10	\$63	9	\$92	9	\$99	10	\$163	10
(Fixed costs)	(\$34)	4	(\$36)	3	(\$38)	9	(\$46)	10	(\$36)	9	(\$36)	9	(\$38)	10	(\$33)	10
Total cost net revenue	\$40	4	\$29	3	\$96	9	\$22	10	\$27	9	\$56	9	\$61	10	\$129	10

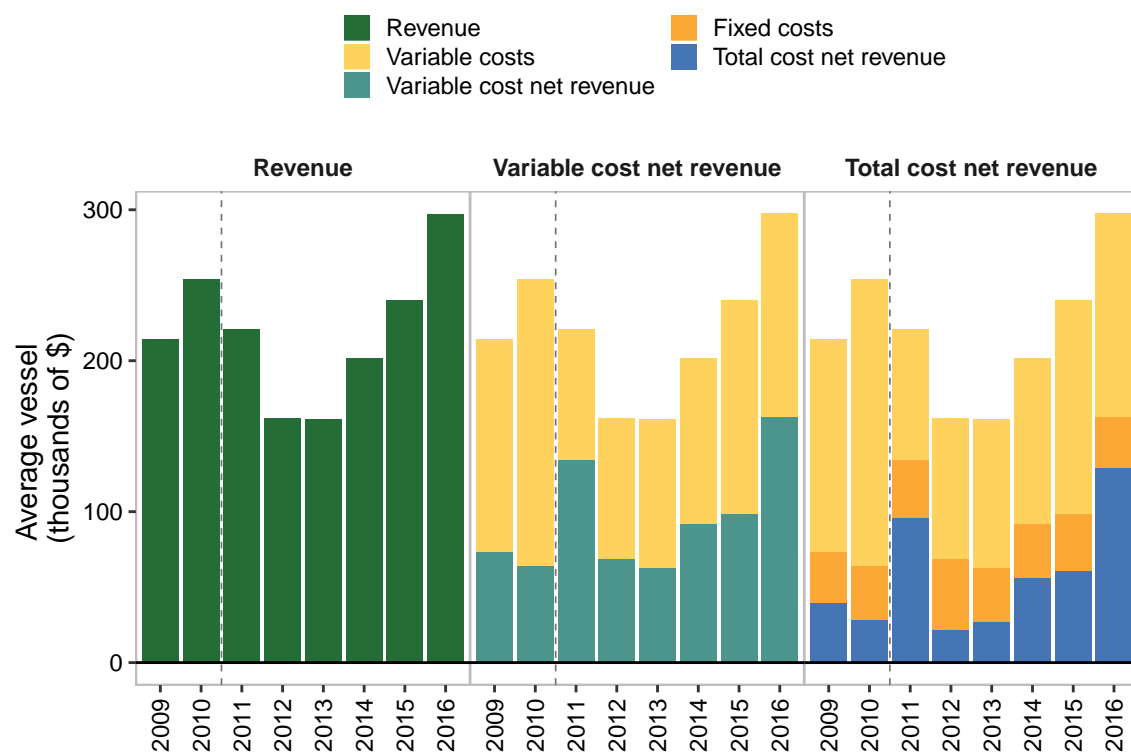


Figure 63: Groundfish fixed gear with trawl endorsement fishery variable cost net revenue and total cost net revenue. Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue in the groundfish fixed gear with fixed gear endorsement fishery. Dashed line represents the beginning of the catch share program.

Table 13.14: Crab fishery average variable cost and total cost net revenue. Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue (thousands of \$) in the Crab fishery (N = number of EDC vessels with non-zero, non-NA responses).

	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Revenue	\$168	62	\$153	62	\$218	68	\$243	61	\$372	65	\$249	58	\$71	52	\$311	59
(Variable costs)	(\$86)	62	(\$85)	62	(\$112)	68	(\$138)	61	(\$176)	65	(\$140)	58	(\$52)	52	(\$158)	59
Variable cost net revenue	\$82	62	\$68	62	\$106	68	\$104	61	\$196	65	\$108	58	\$19	52	\$152	59
(Fixed costs)	(\$33)	62	(\$29)	62	(\$56)	68	(\$65)	61	(\$68)	65	(\$47)	58	(\$22)	52	(\$55)	59
Total cost net revenue	\$49	62	\$40	62	\$50	68	\$40	61	\$128	65	\$61	58	-\$3	52	\$97	59

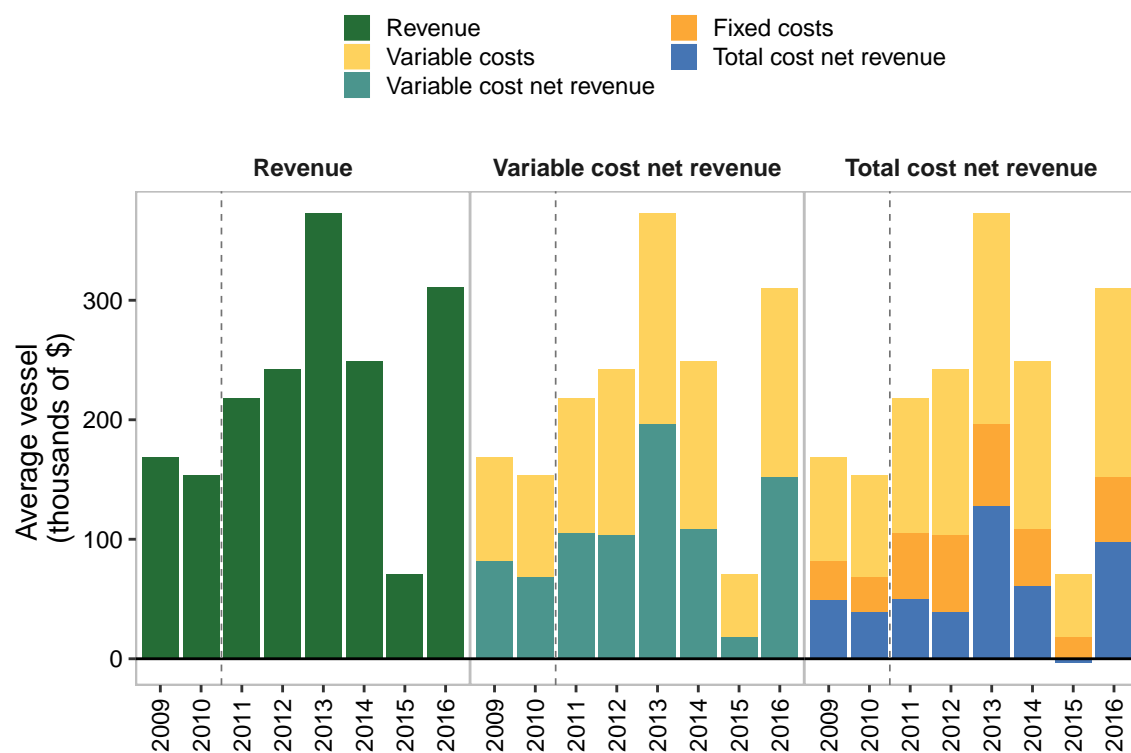


Figure 64: Crab fishery variable cost net revenue and total cost net revenue. Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue in the crab fishery. Dashed line represents the beginning of the catch share program.

Table 13.15: Shrimp fishery average variable cost and total cost net revenue. Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue (thousands of \$) in the Shrimp fishery (N = number of EDC vessels with non-zero, non-NA responses).

	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Revenue	\$111	32	\$155	36	\$341	42	\$321	39	\$380	37	\$501	41	\$633	47	\$373	36
(Variable costs)	(\$63)	32	(\$93)	36	(\$176)	42	(\$178)	39	(\$190)	37	(\$256)	41	(\$319)	47	(\$186)	36
Variable cost net revenue	\$48	32	\$62	36	\$166	42	\$143	39	\$190	37	\$245	41	\$314	47	\$187	36
(Fixed costs)	(\$42)	32	(\$52)	36	(\$86)	42	(\$103)	39	(\$78)	37	(\$85)	41	(\$127)	47	(\$95)	36
Total cost net revenue	\$5	32	\$10	36	\$80	42	\$40	39	\$112	37	\$160	41	\$187	47	\$92	36

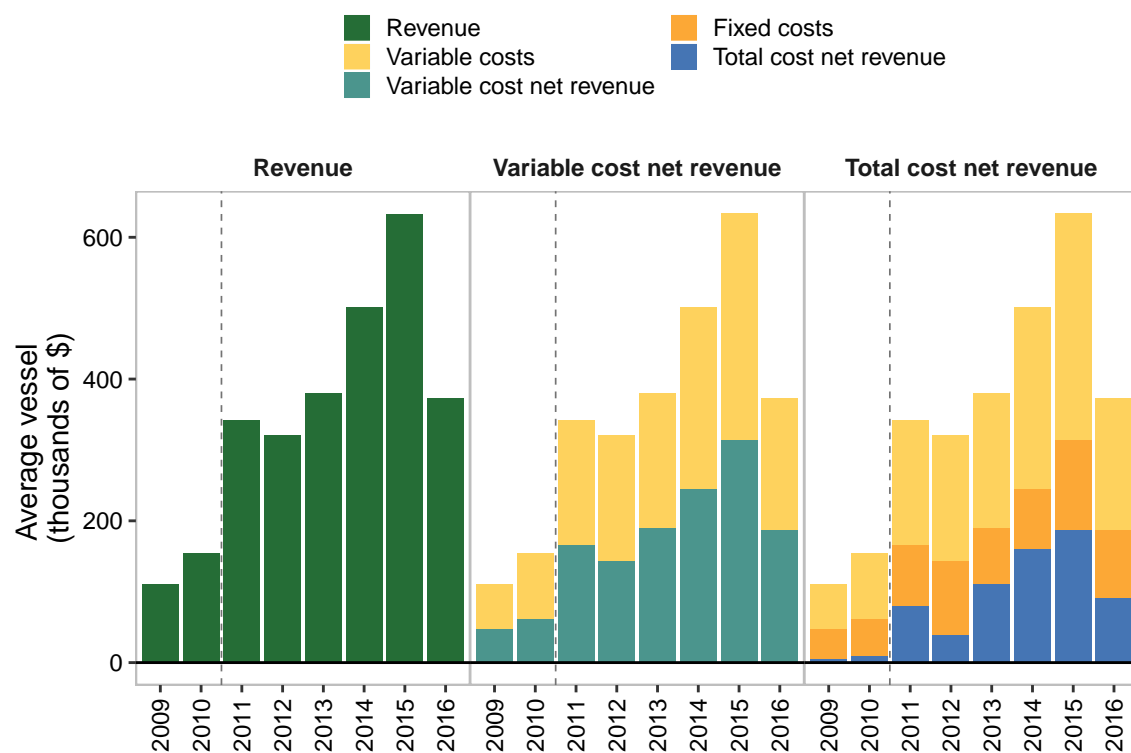


Figure 65: Shrimp fishery variable cost net revenue and total cost net revenue. Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue in the shrimp fishery. Dashed line represents the beginning of the catch share program.

Table 13.16: Other fisheries fishery average variable cost and total cost net revenue. Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue (thousands of \$) in the Other fisheries fishery (N = number of EDC vessels with non-zero, non-NA responses).

	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Revenue	\$33	26	\$40	30	\$44	27	\$36	26	\$40	19	\$53	17	\$40	18	\$63	13
(Variable costs)	(\$32)	26	(\$24)	30	(\$20)	27	(\$23)	26	(\$22)	19	(\$28)	17	(\$31)	18	(\$28)	14
Variable cost net revenue	\$2	26	\$16	30	\$24	27	\$12	26	\$18	19	\$26	17	\$9	18	\$30	14
(Fixed costs)	(\$25)	26	(\$10)	30	(\$10)	27	(\$21)	26	(\$13)	19	(\$8)	17	(\$9)	18	(\$10)	14
Total cost net revenue	-\$23	26	\$6	30	\$15	27	-\$8	26	\$4	19	\$18	17	-\$0	18	\$20	14

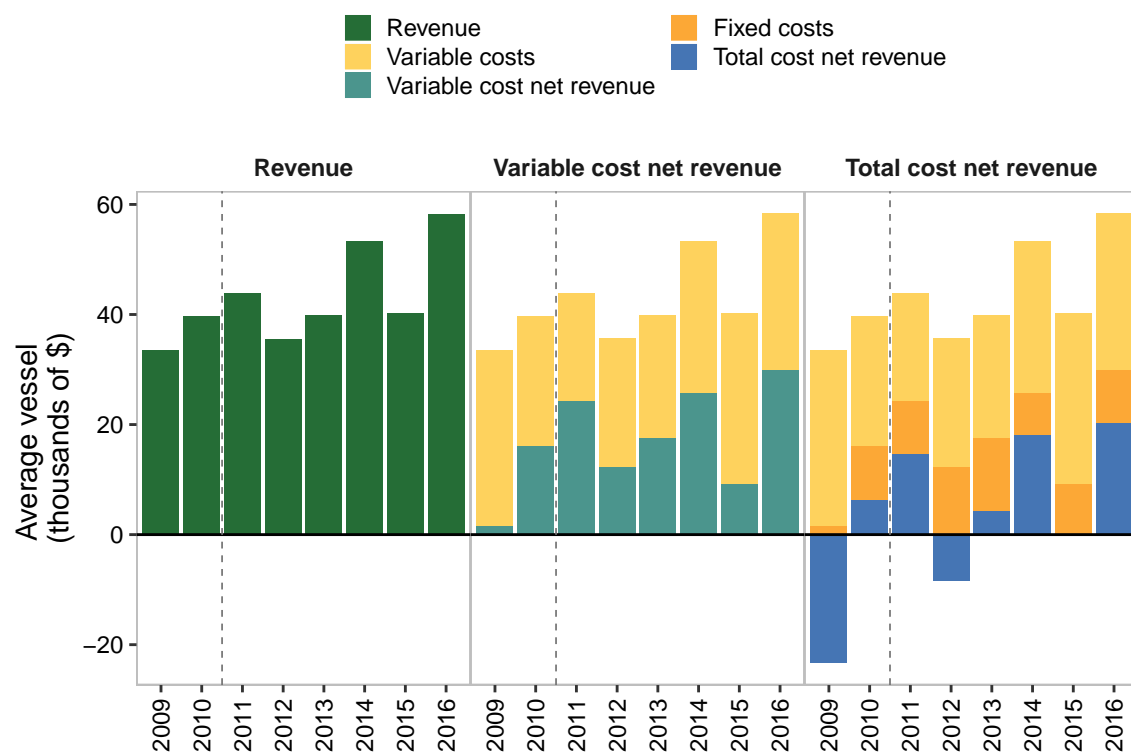


Figure 66: Other fisheries variable cost net revenue and total cost net revenue. Average total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue in Other fisheries (including salmon, tuna, and halibut). Dashed line represents the beginning of the catch share program.

Net revenue variability for all catch shares participation and by fishery

There is high variability in economic performance among vessels that participate in the catch share program. To display that variability while protecting confidential information, variable cost net revenue is calculated and displayed by groups of three vessels (Figures 67 through 75). To calculate the three-vessel averages, the vessels are ranked from lowest to highest by ex-vessel revenue, aggregated into groups of three and then the average costs and net revenue are calculated for these aggregations of vessels. Total cost net revenue is not shown because the fixed costs for one vessel in a group of three are often greater than 90% of the total fixed costs for all three vessels, breaking the EDC Program “90-10 rule” for confidentiality.

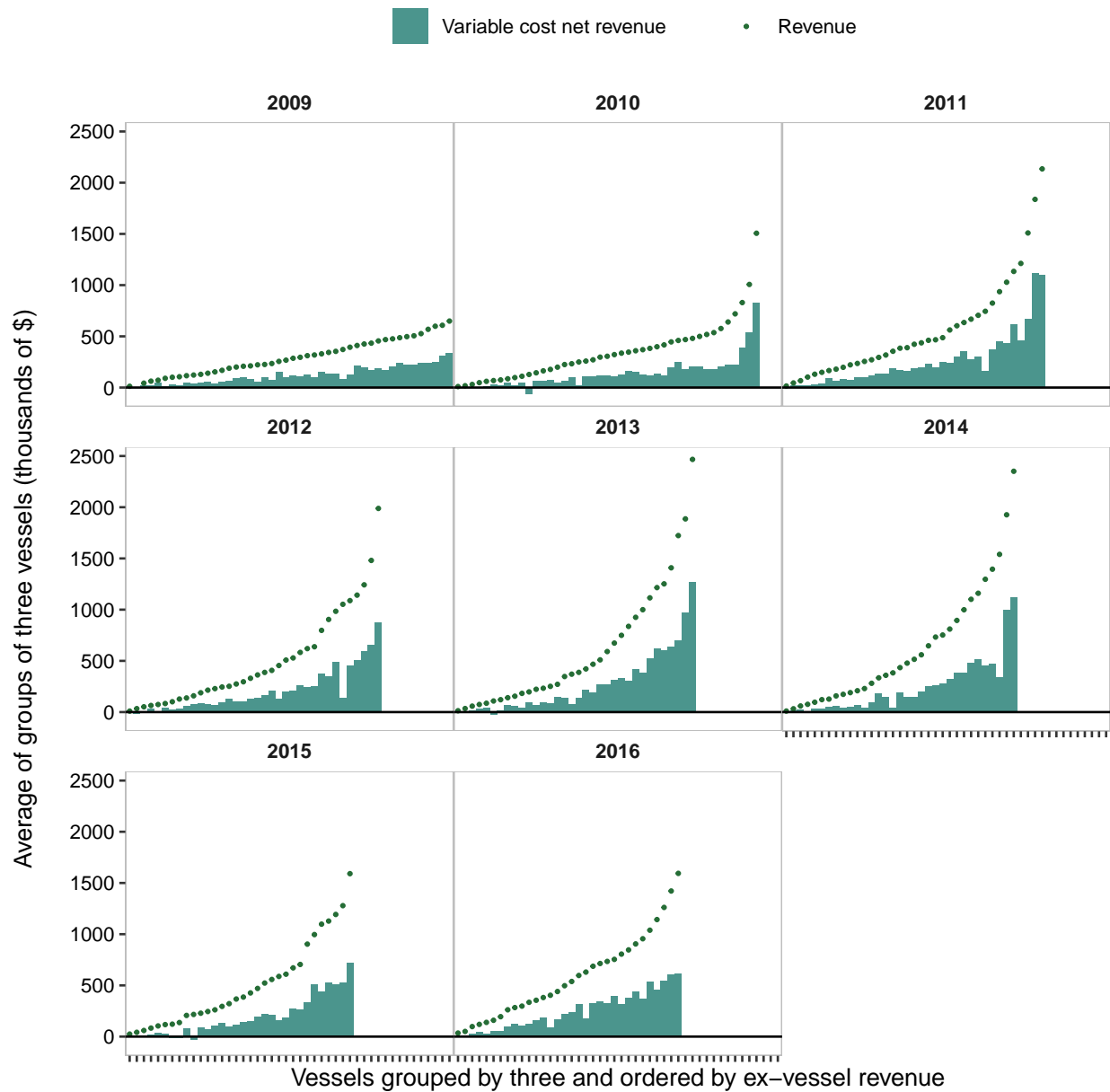


Figure 67: Net revenue in all catch shares fisheries (whiting and non-whiting groundfish) by vessel groups. Revenue (green dots) and variable cost net revenue (blue-green bars) in all catch shares fisheries (whiting and non-whiting groundfish). To protect confidentiality, vessels were sorted by revenue, put into groups of three vessels, and then means were calculated on the group of vessels.

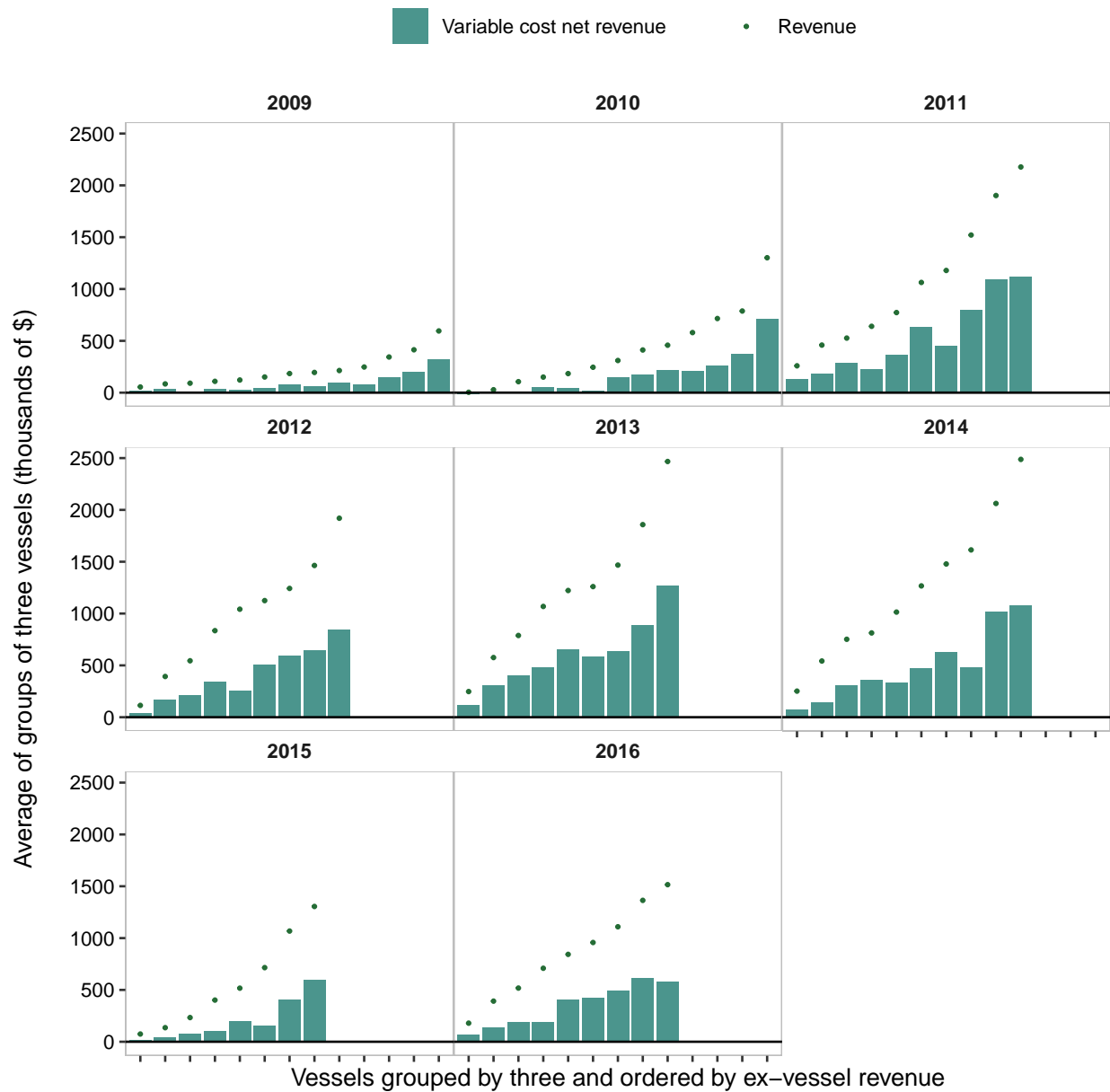


Figure 68: Net revenue in all whiting fisheries (shoreside and at-sea) by vessel groups. Revenue (green dots) and variable cost net revenue (blue-green bars) in all catch shares fisheries (whiting and non-whiting groundfish). To protect confidentiality, vessels were sorted by revenue, put into groups of three vessels, and then means were calculated on the group of vessels.

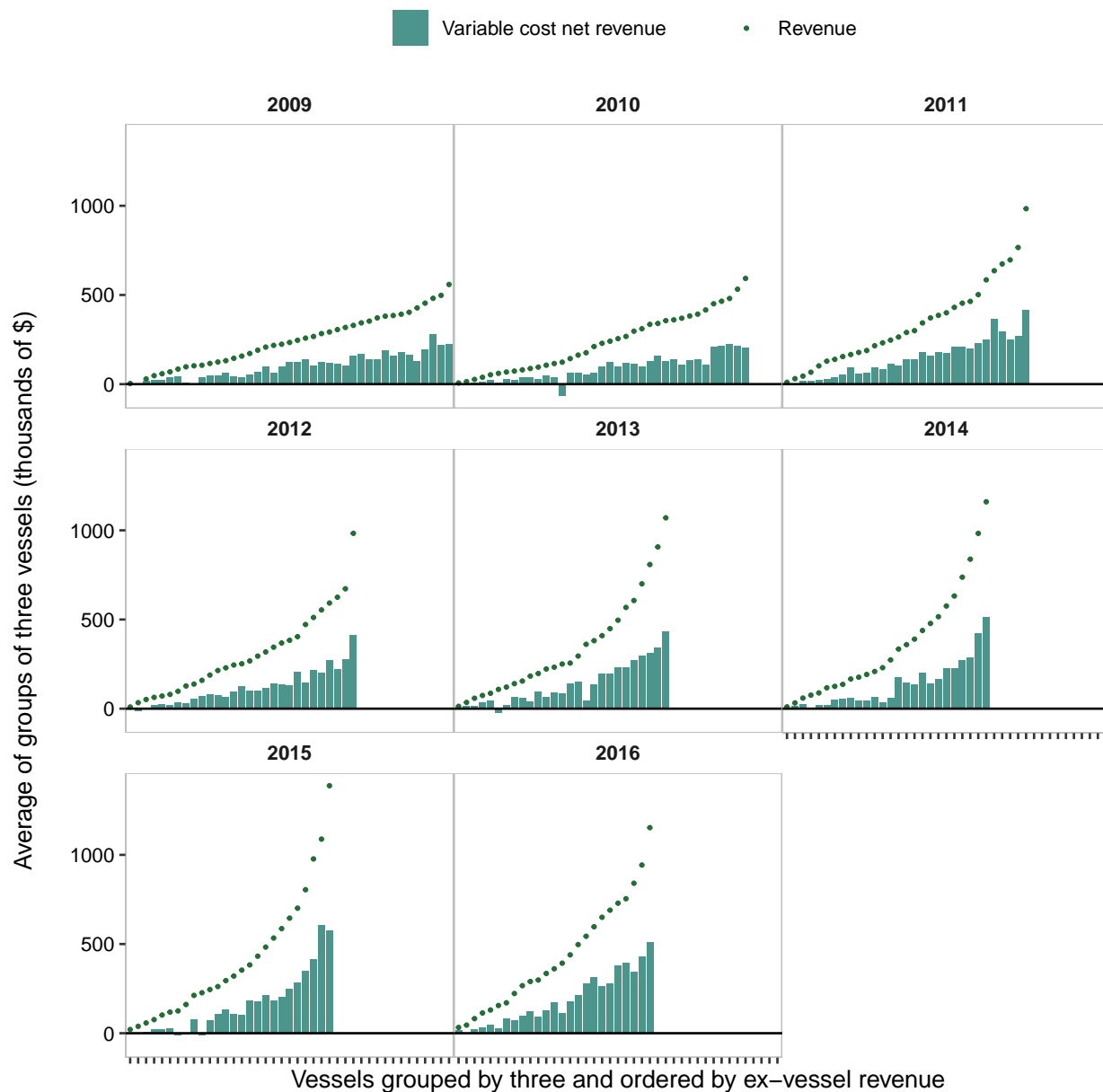


Figure 69: Net revenue in all non-whiting groundfish fisheries (catch shares only) by vessel groups. Revenue (green dots) and variable cost net revenue (blue-green bars) in all catch shares fisheries (whiting and non-whiting groundfish). To protect confidentiality, vessels were sorted by revenue, put into groups of three vessels, and then means were calculated on the group of vessels.

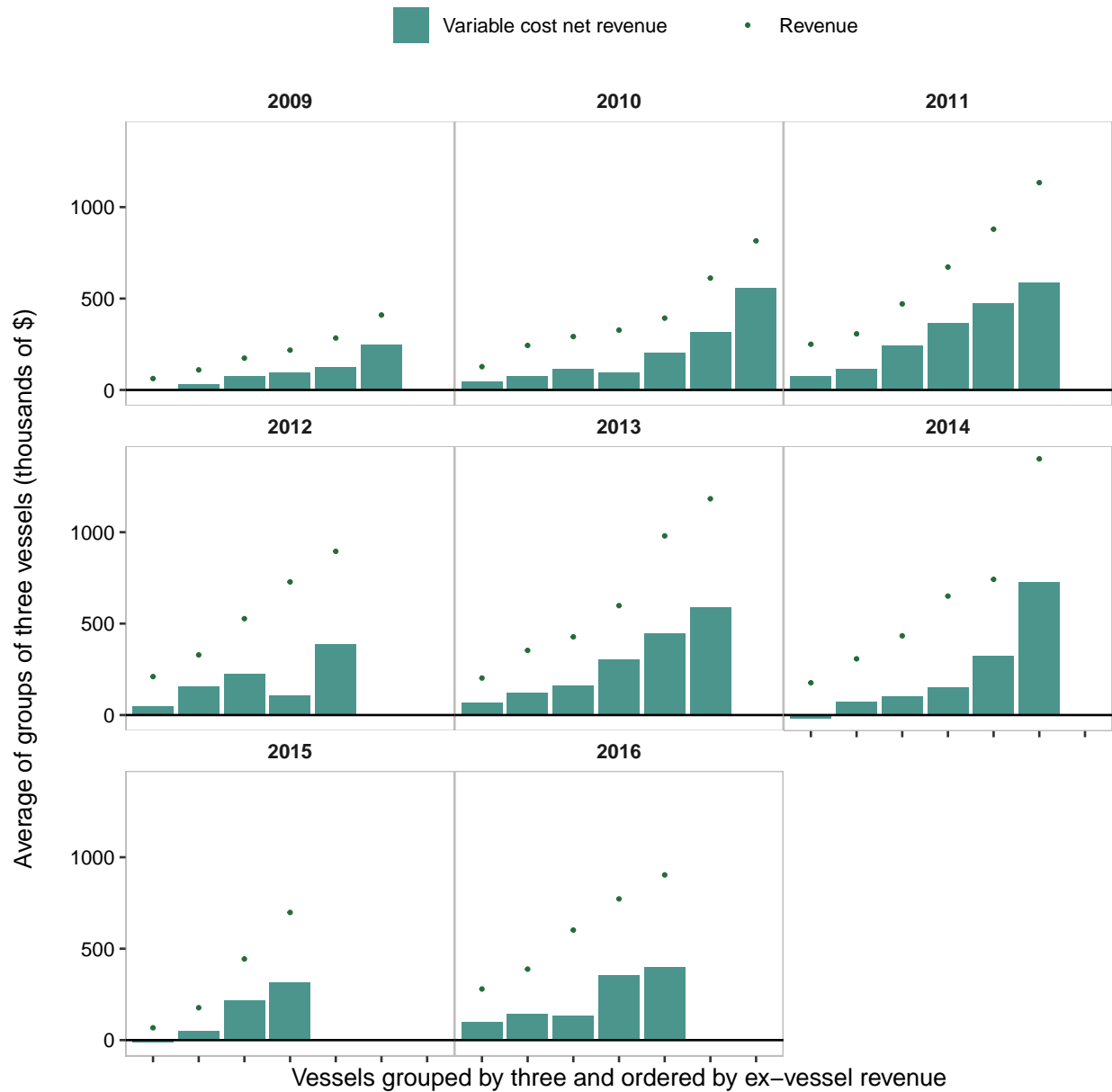


Figure 70: Net revenue in the at-sea Pacific whiting fishery by vessel groups. Revenue (green dots) and variable cost net revenue (blue-green bars) in the at-sea Pacific whiting fishery. To protect confidentiality, vessels were sorted by revenue, put into groups of three vessels, and then means were calculated on the group of vessels.

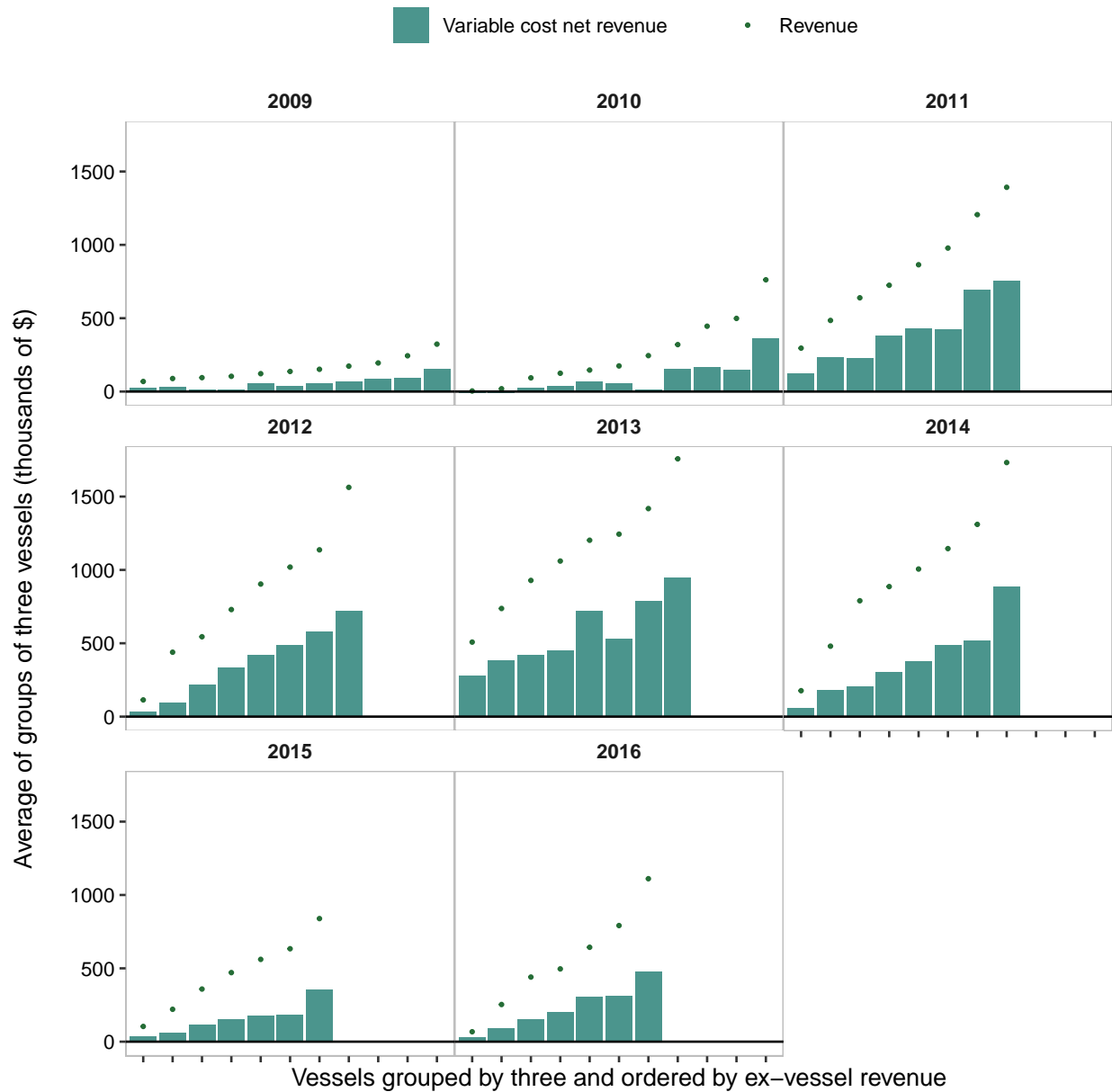


Figure 71: Net revenue in the shoreside Pacific whiting fishery by vessel groups. Revenue (green dots) and variable cost net revenue (blue-green bars) in the shoreside Pacific whiting fishery. To protect confidentiality, vessels were sorted by revenue and means were calculated on groups of three vessels.

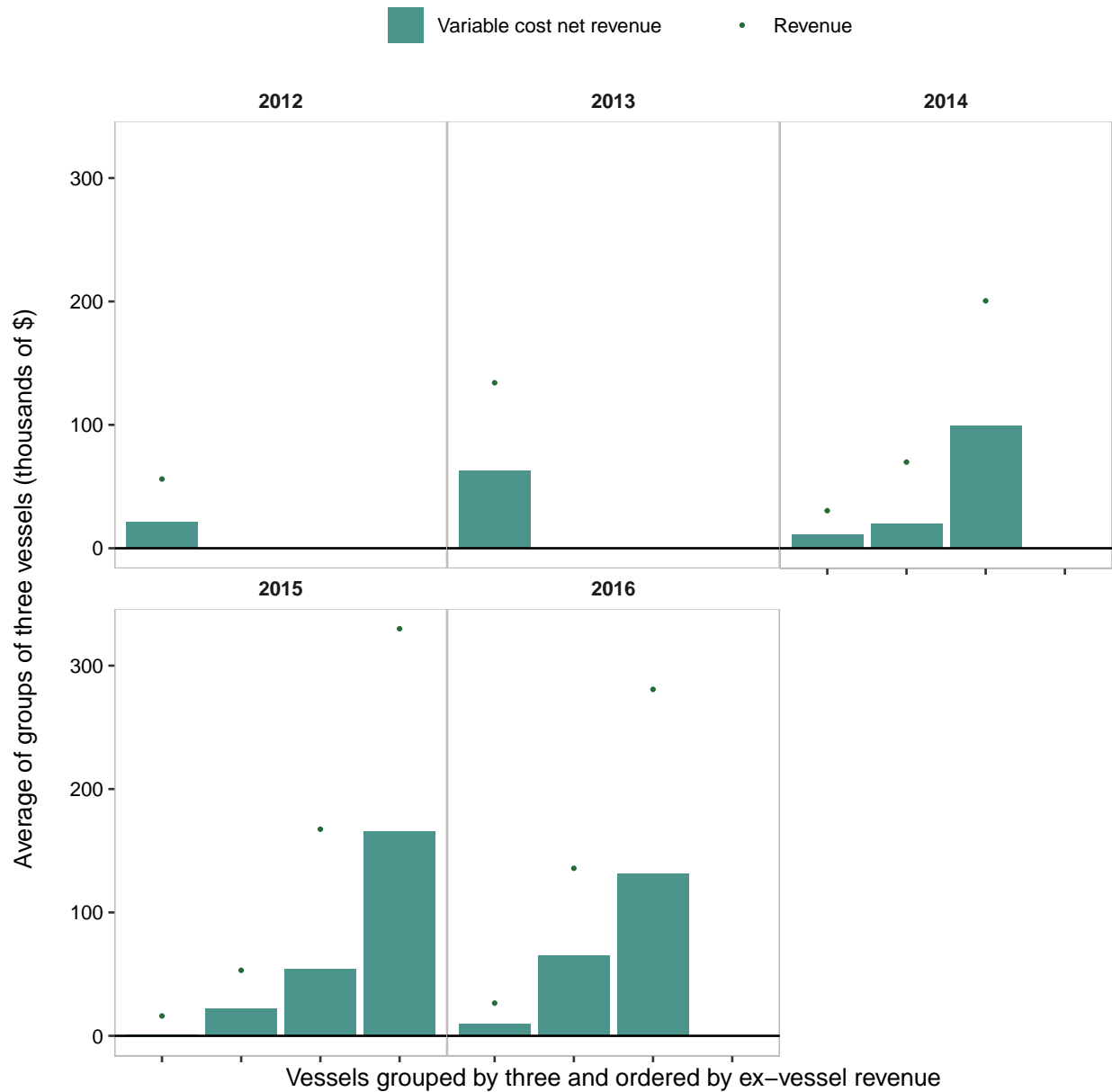


Figure 72: Net revenue in the Non-whiting midwater trawl fishery by vessel groups. Revenue (green dots) and variable cost net revenue (blue-green bars) in the Non-whiting midwater trawl fishery. To protect confidentiality, vessels were sorted by revenue and means were calculated on groups of three vessels.

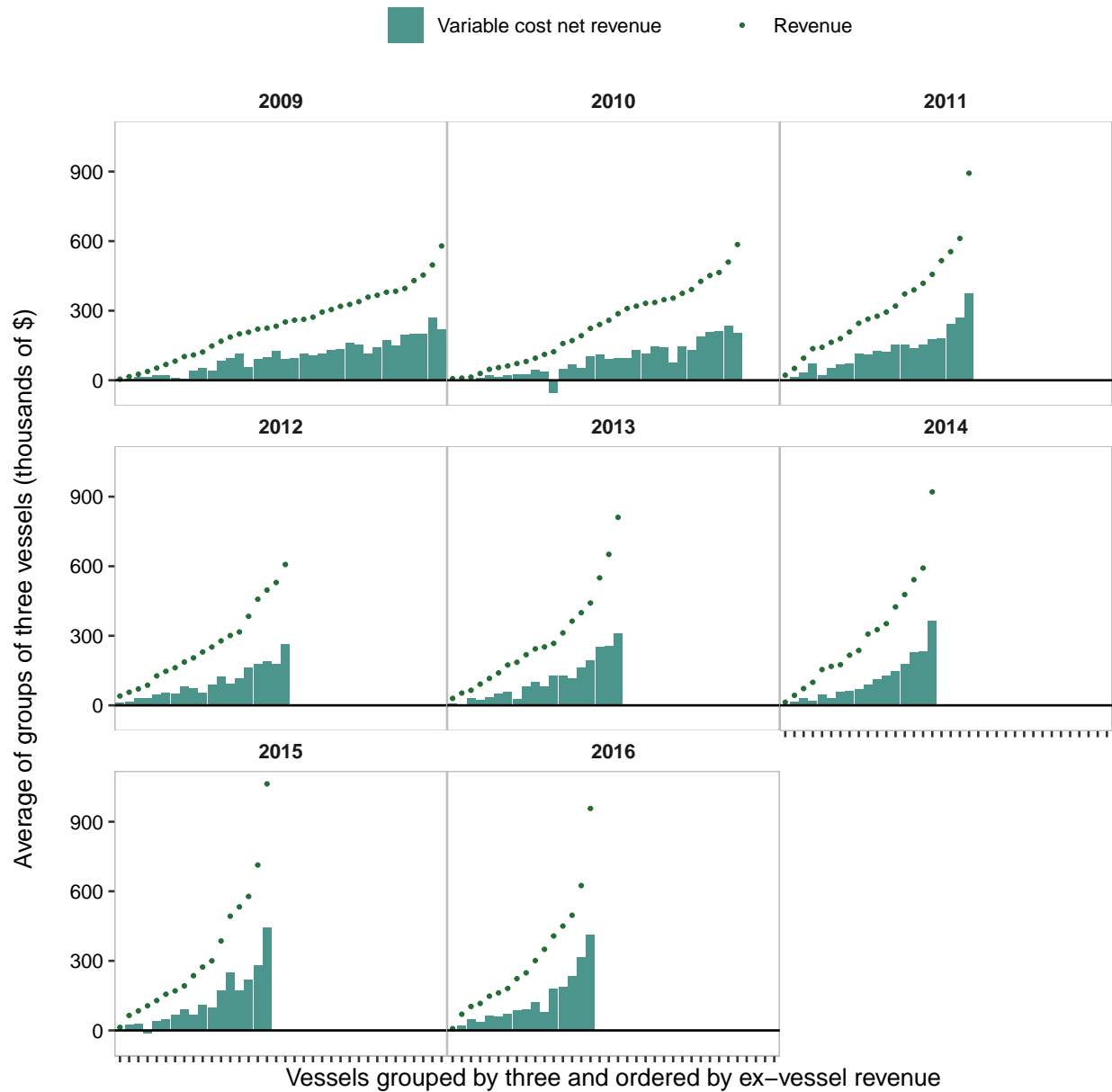


Figure 73: Net revenue in the DTS trawl with trawl endorsement fishery by vessel groups. Revenue (green dots) and variable cost net revenue (blue-green bars) in the DTS trawl with trawl endorsement fishery. To protect confidentiality, vessels were sorted by revenue and means were calculated on groups of three vessels.

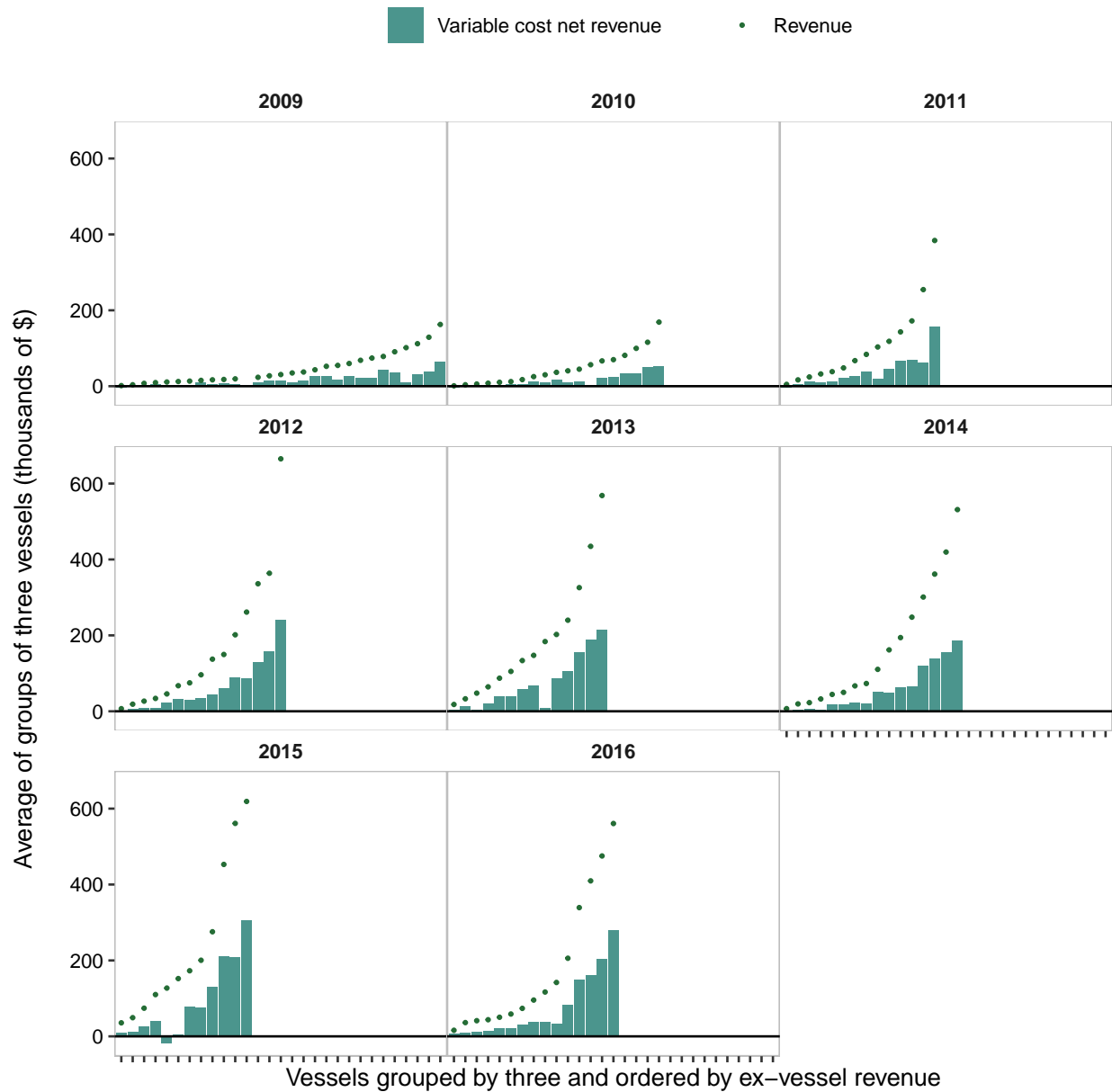


Figure 74: Net revenue in the non-whiting, non-DTS trawl with trawl endorsement fishery by vessel groups. Revenue (green dots) and variable cost net revenue (blue-green bars) in the non-whiting, non-DTS trawl with trawl endorsement fishery. To protect confidentiality, vessels were sorted by revenue and means were calculated on groups of three vessels.

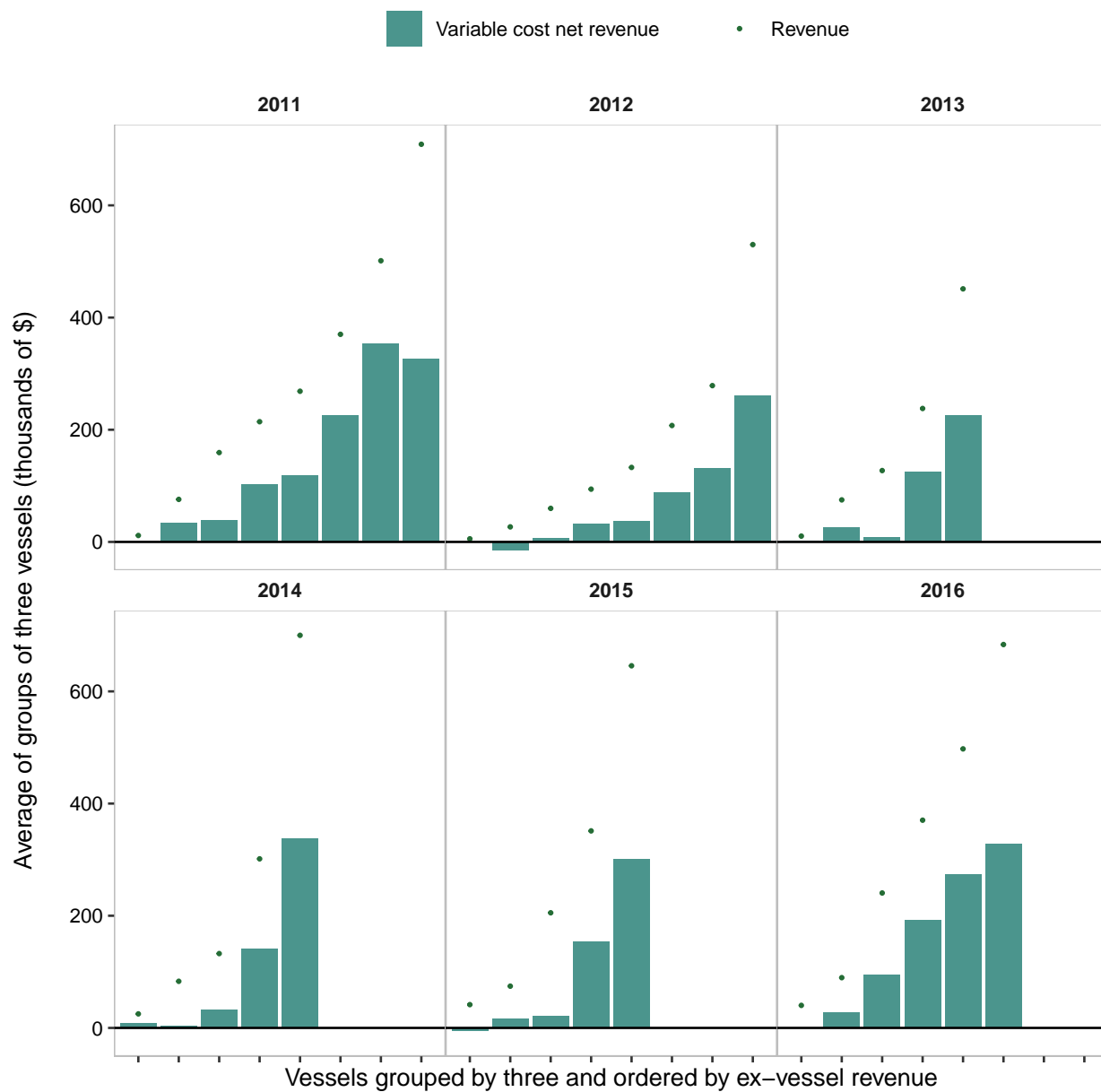


Figure 75: Net revenue in the groundfish fixed gear with trawl endorsement fishery by vessel groups. Revenue (green dots) and variable cost net revenue (blue-green bars) in the groundfish fixed gear with trawl endorsement fishery. To protect confidentiality, vessels were sorted by revenue and means were calculated on groups of three vessels.

13.3 Net revenue including quota costs and earnings

The costs and earnings from quota are an important component of the economic health of the companies that fish in the catch share program. The value of quota is theoretically equal to the profitability of the asset. In theory, a quota owner will fish the quota if the profit they earn from fishing the quota is higher than the price they would receive if they sold the quota. Net revenue including earnings and costs from quota will be less than net revenue without considering quota transactions if quota is purchased from quota share owners not involved with an actively participating vessel.

In the previous sections, we presented net revenue by fishery and calendar year. This was accomplished by using cost disaggregation to allocate variable and fixed costs to each delivery. Unlike the other costs, there is no method for allocating the financial cost of quota to individual deliveries because the source of quota used to cover an individual delivery is not known. Therefore, this section is presented by fiscal year and for all catch share fisheries combined rather than by calendar year by individual fishery. The figures are presented in pairs, the first of each pair depicts the catch share net revenue without including quota revenues or costs and the second pair includes the quota revenues and costs. The pairs are presented for all catch shares, all whiting vessels (includes all catch share activity), and all non-whiting groundfish vessels. The categorization of whiting or non-whiting groundfish vessel is mutually exclusive (if a vessel fished in both the whiting portion of the catch share program or the non-whiting groundfish portion, they are classified as a whiting vessel).

All Catch Shares Net Revenue: Including quota costs and earnings

Table 13.17: All catch share (whiting and non-whiting groundfish) average variable cost and total cost net revenue by survey year with and without quota revenue and quota costs. Average ex-vessel revenue, variable cost net revenue, and total cost net revenue (thousands of \$) for all participation in the catch share (whiting and non-whiting groundfish) fisheries by survey year with and without accounting for quota costs.

	2009		2010		2011		2012		2013		2014		2015		2016	
	With	Without	With	Without	With	Without	With	Without	With	Without	With	Without	With	Without	With	Without
Revenue	\$298.6	\$298.6	\$344.0	\$344.0	\$609.6	\$575.5	\$554.3	\$519.4	\$662.6	\$644.7	\$674.9	\$660.0	\$520.9	\$507.3	\$610.6	\$593.5
Variable cost net revenue	\$122.6	\$122.6	\$138.4	\$138.4	\$247.7	\$265.4	\$203.2	\$207.6	\$265.0	\$291.1	\$223.3	\$254.4	\$156.6	\$192.8	\$205.8	\$250.2
Total cost net revenue	\$22.0	\$22.0	\$45.9	\$45.9	\$86.3	\$104.0	\$50.9	\$55.2	\$135.9	\$161.9	\$88.7	\$119.8	\$66.6	\$102.8	\$105.8	\$150.3

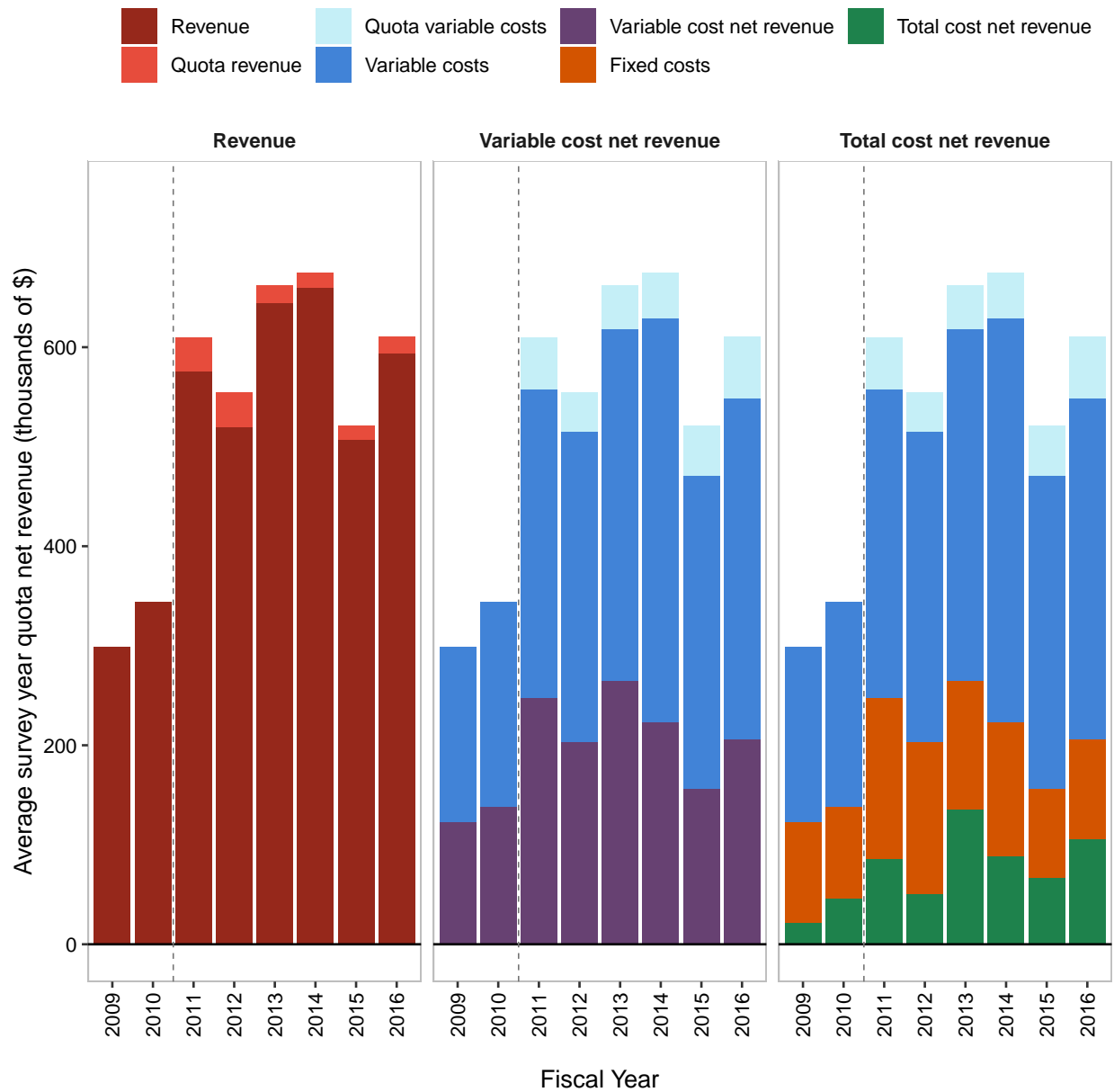


Figure 76: All catch share (whiting and non-whiting groundfish) average net revenue with quota earnings and costs by survey year. Average ex-vessel revenue, quota revenue, variable costs, variable quota costs, variable cost net revenue, fixed costs, and total cost net revenue for all participation in the catch share (whiting and non-whiting groundfish) fisheries by survey year. There are too few observations to display fixed quota costs (purchase or sale of quota shares).

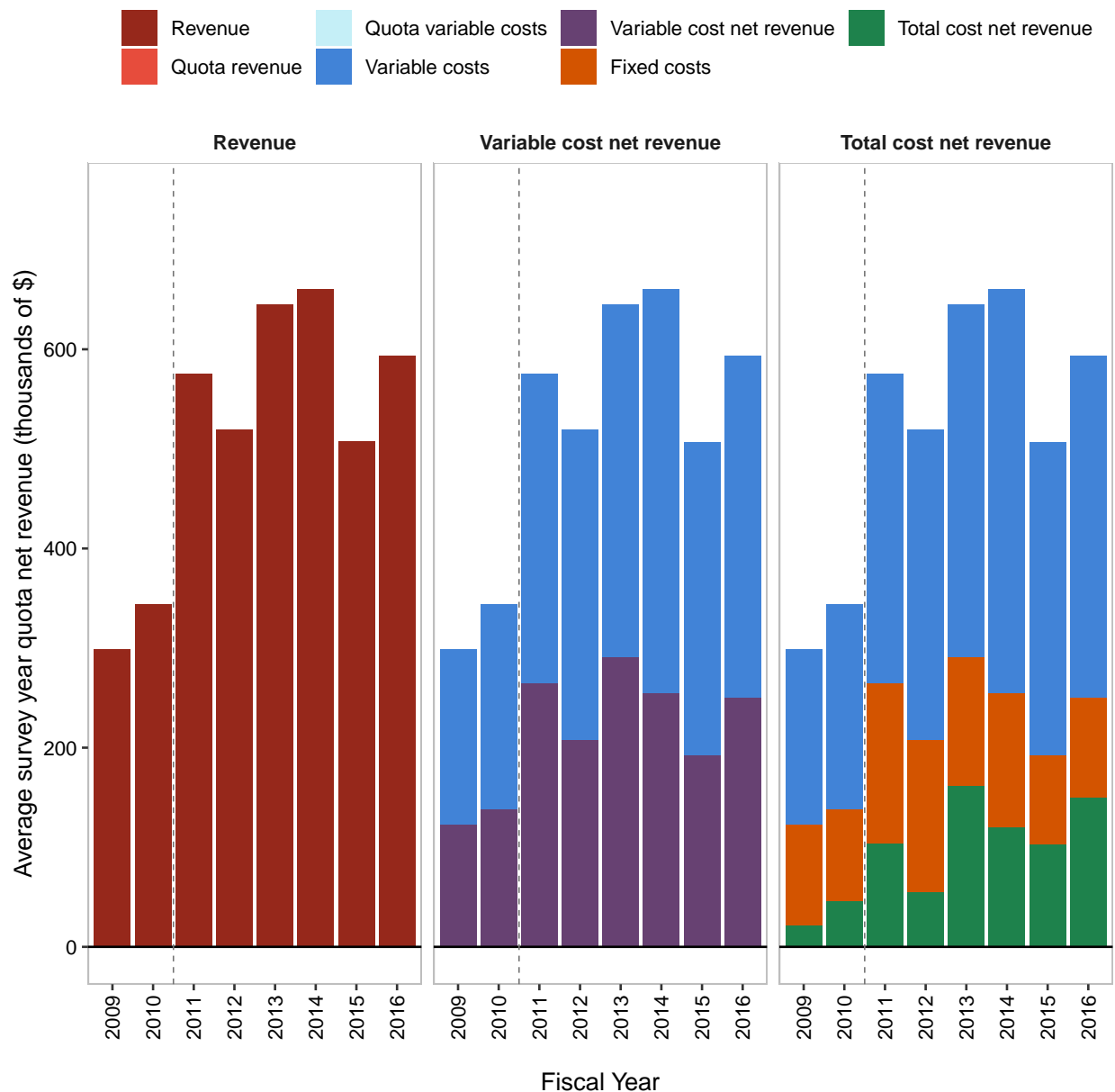


Figure 77: All catch share (whiting and non-whiting groundfish) average net revenue without quota earnings and costs by survey year. Average ex-vessel revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue for all participation in the catch share fisheries (whiting and non-whiting groundfish) by survey year. Dashed line represents the beginning of the catch share program.

Catch Shares Net Revenue for Whiting Vessels: Including quota costs and earnings

Table 13.18: Whiting vessel average net revenue for all catch shares participation with quota earnings and costs by survey year. Average revenue, variable cost net revenue, and total cost net revenue (millions of \$) for all whiting vessels by survey year with and without quota costs.

	2009		2010		2011		2012		2013		2014		2015		2016	
	With	Without	With	Without	With	Without	With	Without	With	Without	With	Without	With	Without	With	Without
Revenue	\$0.43	\$0.43	\$0.56	\$0.56	\$1.17	\$1.15	\$1.13	\$1.09	\$1.44	\$1.42	\$1.37	\$1.35	\$0.81	\$0.78	\$1.01	\$0.98
Variable cost net revenue	\$0.19	\$0.19	\$0.24	\$0.24	\$0.53	\$0.56	\$0.44	\$0.45	\$0.65	\$0.71	\$0.50	\$0.54	\$0.27	\$0.30	\$0.38	\$0.41
Total cost net revenue	\$-0.00	\$-0.00	\$0.07	\$0.07	\$0.15	\$0.19	\$0.06	\$0.08	\$0.34	\$0.40	\$0.16	\$0.20	\$0.09	\$0.12	\$0.20	\$0.23

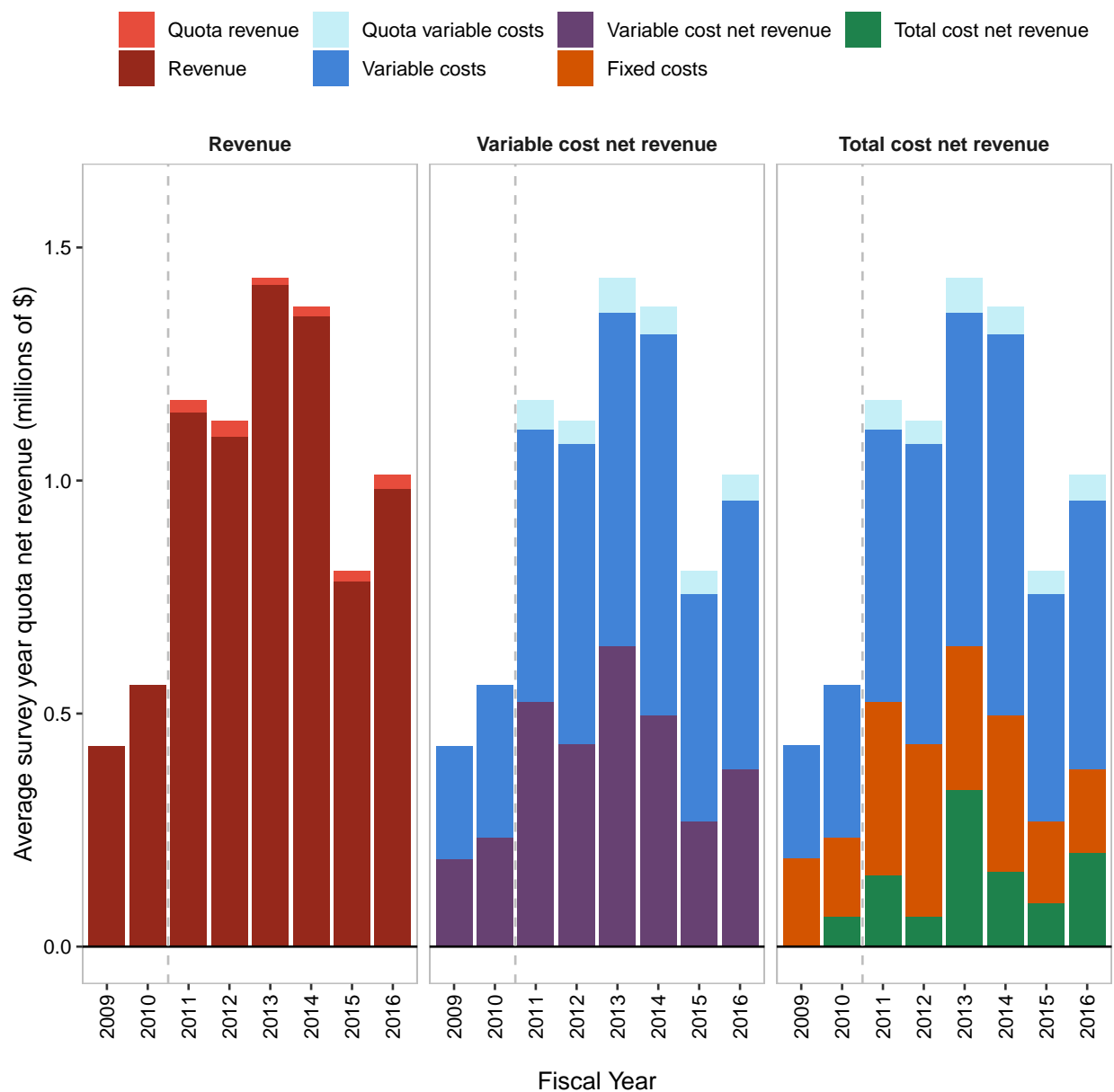


Figure 78: Whiting vessel average net revenue for all catch shares participation with quota earnings and costs by survey year. Average ex-vessel revenue, quota revenue, variable costs, variable quota costs, variable cost net revenue, fixed costs, and total cost net revenue for whiting vessel participation in the catch share fisheries (whiting and non-whiting groundfish) by survey year. There are too few observations to display fixed quota costs (purchase or sale of quota shares). Dashed line represents the beginning of the catch share program.

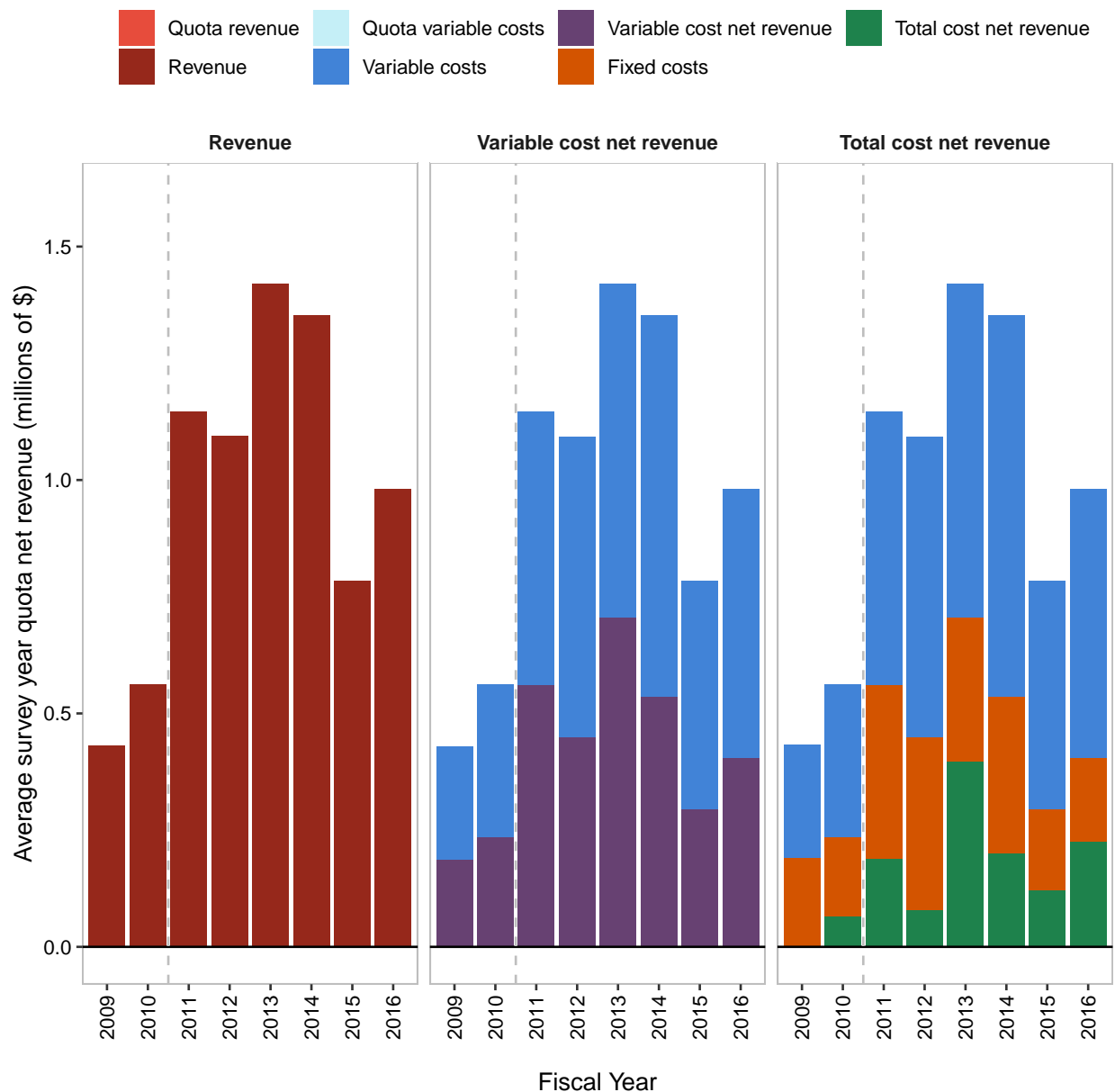


Figure 79: Whiting vessel average net revenue for all catch shares participation without quota earnings and costs by survey year. Average ex-vessel revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue for whiting vessel participation in the catch share fisheries (whiting and non-whiting groundfish) by survey year. Dashed line represents the beginning of the catch share program.

Catch Shares Net Revenue for Non-whiting Groundfish Vessels: Including quota costs and earnings

Table 13.19: Non-whiting groundfish vessel average net revenue for all catch shares participation with quota earnings and costs by survey year. Average revenue, variable cost net revenue, and total cost net revenue (thousands of \$) for non-whiting groundfish vessels by survey year with and without accounting for quota costs.

	2009		2010		2011		2012		2013		2014		2015		2016	
	With	Without	With	Without	With	Without	With	Without	With	Without	With	Without	With	Without	With	Without
Revenue	\$242.9	\$242.9	\$243.8	\$243.8	\$389.8	\$352.8	\$349.0	\$313.9	\$363.9	\$344.6	\$380.2	\$367.3	\$419.3	\$408.4	\$447.9	\$436.1
Variable cost net revenue	\$95.1	\$95.1	\$93.6	\$93.6	\$139.1	\$150.0	\$120.2	\$120.9	\$118.1	\$130.8	\$107.4	\$135.2	\$116.6	\$156.0	\$134.6	\$187.3
Total cost net revenue	\$32.3	\$32.3	\$37.1	\$37.1	\$60.1	\$71.1	\$46.2	\$46.8	\$58.2	\$70.9	\$58.3	\$86.1	\$56.9	\$96.3	\$67.2	\$119.9

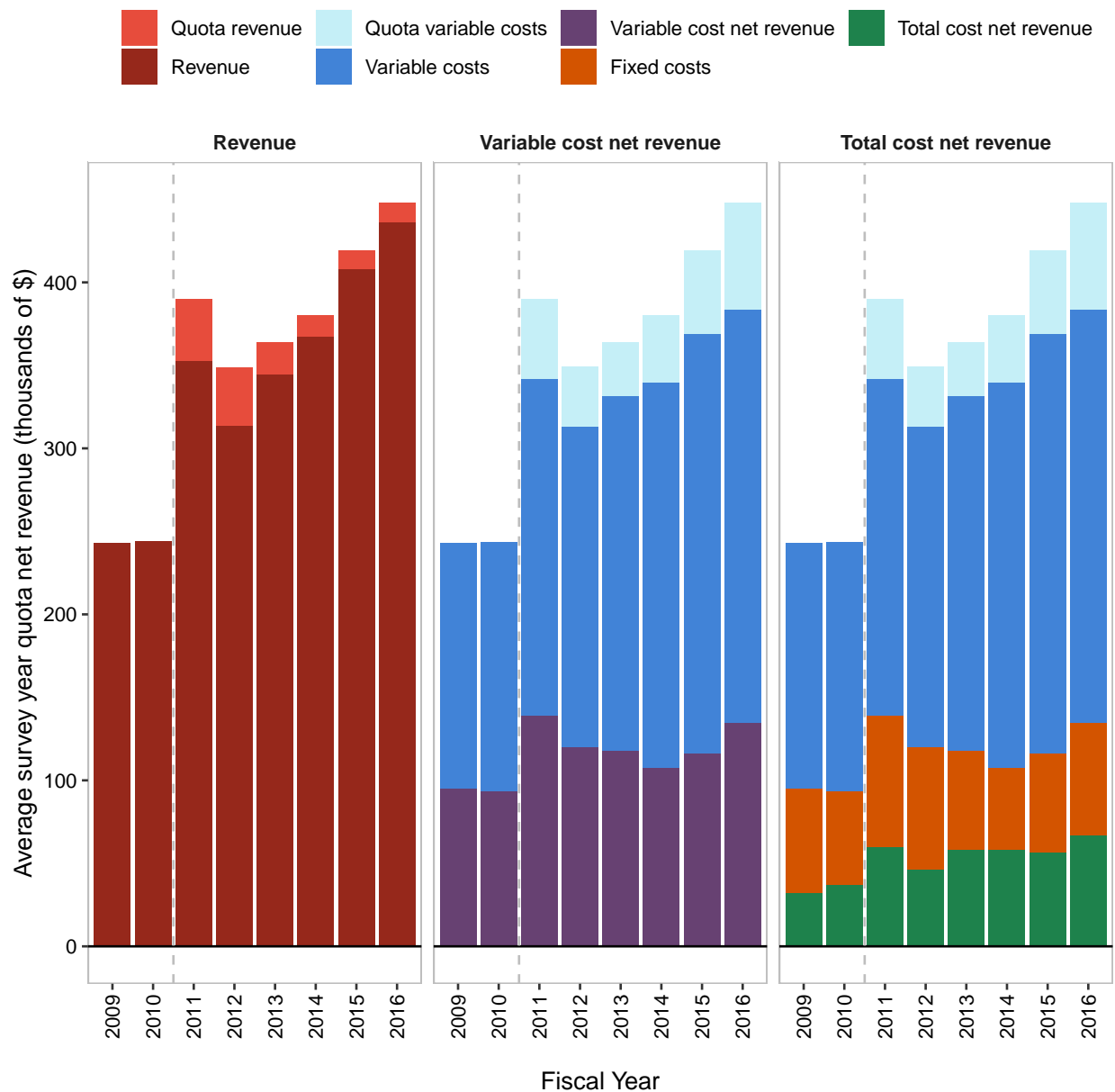


Figure 80: Non-whiting groundfish vessel average net revenue for all catch shares participation with quota earnings and costs by survey year. Average ex-vessel revenue, quota revenue, variable costs, variable quota costs, variable cost net revenue, fixed costs, and total cost net revenue for non-whiting groundfish vessel participation in catch share fisheries (non-whiting groundfish) by survey year. There are too few observations to display fixed quota costs (purchase or sale of quota shares). Dashed line represents the beginning of the catch share program.

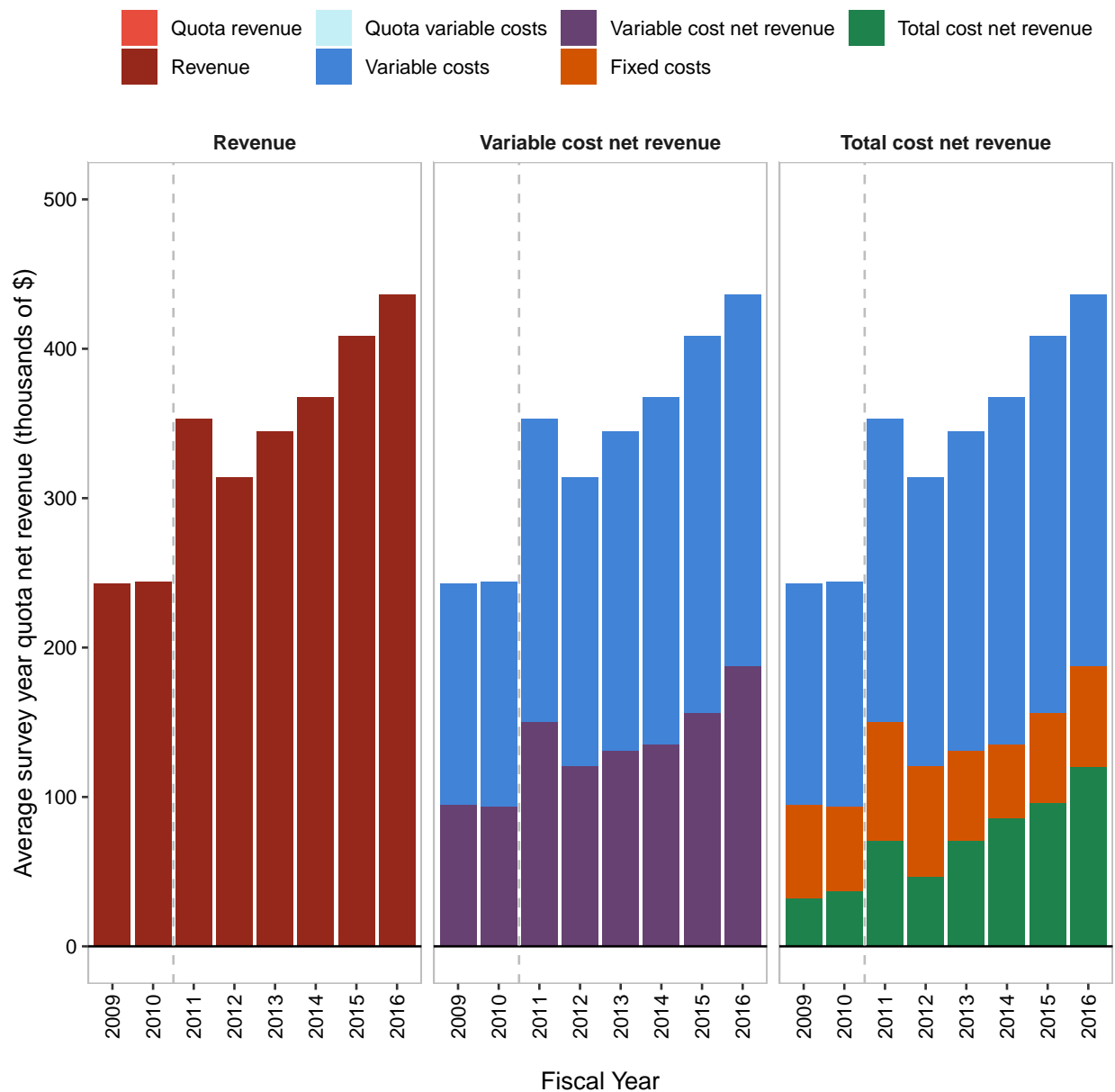


Figure 81: Non-whiting groundfish vessel average net revenue for all catch shares participation without quota earnings and costs by survey year. Average ex-vessel revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue for all non-whiting groundfish vessels by participation in catch share fisheries (non-whiting groundfish) by survey year. Dashed line represents the beginning of the catch share program.

14 Economic Performance: Cost, Revenue, and Net Revenue Rates

As an indication of changes in efficiency and profitability, rates are calculated for revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue by days at sea and per metric ton of fish landed for all West Coast vessels (Table 14.1), delineated by vessel size (Tables 14.2 through 14.4), and home port state (Tables 14.5 through 14.7).

14.1 All West Coast operations

Table 14.1: Mean and median rates for all vessels that fished on the West Coast. Mean and median revenue, costs, and net revenues (\$) per day and per metric ton (mt) landed ($N_{2009} = 129$, $N_{2010} = 128$, $N_{2011} = 132$, $N_{2012} = 128$, $N_{2013} = 119$, $N_{2014} = 120$, $N_{2015} = 114$, $N_{2016} = 112$).

Description	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Revenue/day	\$5,257	\$4,624	\$5,839	\$4,534	\$8,792	\$7,447	\$8,118	\$6,676	\$9,947	\$8,821	\$9,326	\$8,423	\$7,505	\$7,501	\$8,236	\$8,194
Revenue/mt	\$1,308	\$1,108	\$1,366	\$1,066	\$2,443	\$1,485	\$2,504	\$1,395	\$2,250	\$1,509	\$2,474	\$1,477	\$2,533	\$1,651	\$2,715	\$1,836
Variable costs/day	\$3,068	\$2,594	\$3,449	\$2,743	\$4,752	\$3,938	\$4,796	\$3,965	\$5,274	\$4,689	\$5,471	\$4,781	\$4,553	\$4,594	\$4,625	\$4,439
Variable costs/mt	\$968	\$638	\$838	\$670	\$1,570	\$849	\$1,608	\$878	\$1,252	\$801	\$1,473	\$864	\$1,694	\$911	\$1,456	\$1,008
Variable cost net revenue/day	\$2,189	\$1,780	\$2,390	\$1,578	\$4,040	\$3,192	\$3,322	\$2,514	\$4,673	\$3,830	\$3,855	\$3,277	\$2,952	\$2,989	\$3,610	\$3,568
Variable cost net revenue/mt	\$340	\$366	\$528	\$391	\$872	\$595	\$896	\$536	\$998	\$628	\$1,001	\$616	\$839	\$690	\$1,259	\$784
Fixed costs/day	\$1,706	\$948	\$1,515	\$940	\$2,515	\$1,482	\$2,648	\$1,723	\$2,121	\$1,364	\$1,971	\$1,051	\$1,564	\$1,177	\$1,598	\$1,179
Fixed costs/mt	\$399	\$239	\$320	\$226	\$1,222	\$295	\$1,292	\$352	\$478	\$238	\$542	\$200	\$546	\$281	\$517	\$281
Total cost net revenue/day	\$482	\$534	\$875	\$577	\$1,525	\$1,501	\$674	\$722	\$2,551	\$2,242	\$1,884	\$1,953	\$1,388	\$1,563	\$2,013	\$2,134
Total cost net revenue/mt	-\$58	\$105	\$208	\$111	-\$350	\$229	-\$396	\$136	\$519	\$355	\$459	\$379	\$293	\$301	\$742	\$463

14.2 All West Coast operations by vessel length

Table 14.2: Small vessel mean and median rates for West Coast operations. Mean and median revenue, costs, and net revenue (\$) per day and per metric ton (mt) harvested. ($N_{2009} = 45$, $N_{2010} = 43$, $N_{2011} = 49$, $N_{2012} = 49$, $N_{2013} = 42$, $N_{2014} = 42$, $N_{2015} = 40$, $N_{2016} = 37$).

Description	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Revenue/day	\$3,328	\$2,920	\$3,452	\$3,279	\$5,527	\$4,608	\$4,614	\$3,659	\$6,119	\$5,246	\$5,207	\$5,043	\$4,798	\$4,544	\$6,506	\$6,506
Revenue/mt	\$2,149	\$1,590	\$2,331	\$1,788	\$3,850	\$4,080	\$3,978	\$4,303	\$3,742	\$3,049	\$4,036	\$2,760	\$4,362	\$2,756	\$4,785	\$4,995
Variable costs/day	\$1,866	\$1,645	\$1,897	\$1,735	\$3,135	\$2,910	\$2,735	\$2,589	\$3,097	\$2,702	\$3,095	\$3,097	\$2,965	\$2,681	\$3,555	\$3,664
Variable costs/mt	\$1,165	\$885	\$1,234	\$974	\$2,865	\$1,718	\$2,630	\$2,245	\$2,054	\$1,401	\$2,529	\$1,547	\$2,983	\$1,964	\$2,548	\$2,308
Variable cost net revenue/day	\$1,463	\$1,060	\$1,555	\$1,292	\$2,392	\$2,169	\$1,878	\$1,528	\$3,023	\$2,564	\$2,112	\$1,918	\$1,832	\$1,488	\$2,951	\$2,668
Variable cost net revenue/mt	\$984	\$603	\$1,097	\$735	\$985	\$1,199	\$1,348	\$798	\$1,688	\$1,142	\$1,506	\$947	\$1,380	\$847	\$2,237	\$2,143
Fixed costs/day	\$755	\$600	\$674	\$587	\$1,791	\$1,073	\$1,698	\$958	\$1,146	\$896	\$798	\$569	\$886	\$705	\$968	\$700
Fixed costs/mt	\$607	\$357	\$498	\$363	\$2,537	\$609	\$2,488	\$804	\$704	\$470	\$575	\$379	\$855	\$726	\$826	\$521
Total cost net revenue/day	\$708	\$346	\$881	\$606	\$601	\$1,021	\$181	\$582	\$1,877	\$1,461	\$1,313	\$1,368	\$946	\$1,046	\$1,983	\$2,098
Total cost net revenue/mt	\$378	\$291	\$599	\$352	-\$1,552	\$508	-\$1,140	\$390	\$984	\$884	\$931	\$618	\$524	\$566	\$1,411	\$1,065

Table 14.3: Medium vessel mean and median rates for West Coast operations. Mean and median revenue, costs, and net revenue (\$) per day and per metric ton (mt) harvested. ($N_{2009} = 53$, $N_{2010} = 52$, $N_{2011} = 56$, $N_{2012} = 55$, $N_{2013} = 53$, $N_{2014} = 53$, $N_{2015} = 49$, $N_{2016} = 49$).

Description	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Revenue/day	\$4,495	\$4,258	\$4,546	\$4,148	\$7,510	\$7,285	\$7,183	\$6,699	\$8,435	\$8,561	\$8,343	\$8,428	\$8,667	\$9,217	\$8,265	\$8,222
Revenue/mt	\$1,224	\$1,145	\$1,272	\$1,062	\$2,140	\$1,412	\$2,251	\$1,383	\$2,160	\$1,509	\$2,516	\$1,505	\$2,334	\$1,680	\$2,574	\$1,857
Variable costs/day	\$2,753	\$2,502	\$3,077	\$2,719	\$4,269	\$4,091	\$4,429	\$3,964	\$4,713	\$4,440	\$4,881	\$4,854	\$5,077	\$4,770	\$4,579	\$4,231
Variable costs/mt	\$836	\$698	\$938	\$674	\$1,169	\$813	\$1,385	\$871	\$1,209	\$801	\$1,394	\$867	\$1,403	\$939	\$1,332	\$1,025
Variable cost net revenue/day	\$1,743	\$1,564	\$1,469	\$1,229	\$3,240	\$3,170	\$2,754	\$2,377	\$3,722	\$3,468	\$3,461	\$3,174	\$3,590	\$3,979	\$3,686	\$3,663
Variable cost net revenue/mt	\$388	\$363	\$334	\$407	\$971	\$590	\$866	\$545	\$951	\$656	\$1,122	\$617	\$931	\$733	\$1,242	\$864
Fixed costs/day	\$1,173	\$929	\$1,194	\$928	\$1,941	\$1,375	\$2,065	\$1,605	\$1,764	\$1,151	\$1,827	\$1,094	\$1,701	\$1,274	\$1,719	\$1,278
Fixed costs/mt	\$320	\$240	\$314	\$266	\$558	\$275	\$757	\$361	\$519	\$242	\$788	\$212	\$537	\$282	\$521	\$316
Total cost net revenue/day	\$570	\$483	\$275	\$545	\$1,299	\$1,560	\$689	\$723	\$1,958	\$1,927	\$1,634	\$2,264	\$1,889	\$2,337	\$1,967	\$2,121
Total cost net revenue/mt	\$68	\$139	\$19	\$118	\$413	\$314	\$109	\$191	\$433	\$406	\$334	\$420	\$393	\$466	\$721	\$513

Table 14.4: Large vessel mean and median rates for West Coast operations. Mean and median revenue, costs, and net revenue (\$) per day and per metric ton (mt) harvested. ($N_{2009} = 37$, $N_{2010} = 38$, $N_{2011} = 34$, $N_{2012} = 32$, $N_{2013} = 32$, $N_{2014} = 32$, $N_{2015} = 32$, $N_{2016} = 33$).

Description	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Revenue/day	\$8,551	\$7,059	\$10,091	\$8,270	\$15,188	\$15,925	\$14,440	\$13,928	\$16,687	\$14,978	\$15,838	\$14,115	\$9,244	\$9,068	\$10,070	\$9,799
Revenue/mt	\$432	\$233	\$399	\$217	\$1,008	\$269	\$714	\$315	\$515	\$269	\$471	\$235	\$720	\$193	\$801	\$196
Variable costs/day	\$4,928	\$4,798	\$5,632	\$5,358	\$7,716	\$7,668	\$8,225	\$7,711	\$8,668	\$7,697	\$9,280	\$8,343	\$5,696	\$5,601	\$5,766	\$6,189
Variable costs/mt	\$917	\$125	\$260	\$133	\$384	\$131	\$411	\$189	\$294	\$138	\$278	\$159	\$510	\$135	\$460	\$120
Variable cost net revenue/day	\$3,623	\$2,861	\$4,458	\$3,102	\$7,472	\$6,473	\$6,215	\$6,256	\$8,019	\$6,882	\$6,559	\$5,700	\$3,548	\$3,236	\$4,304	\$4,374
Variable cost net revenue/mt	-\$484	\$90	\$140	\$95	\$623	\$142	\$303	\$149	\$222	\$143	\$193	\$101	\$210	\$86	\$341	\$82
Fixed costs/day	\$3,524	\$2,022	\$2,843	\$1,956	\$4,292	\$3,474	\$4,736	\$2,968	\$3,772	\$2,901	\$3,704	\$2,278	\$2,063	\$1,573	\$2,201	\$1,807
Fixed costs/mt	\$254	\$78	\$128	\$66	\$303	\$86	\$221	\$111	\$123	\$52	\$121	\$42	\$138	\$55	\$190	\$42
Total cost net revenue/day	\$99	\$749	\$1,615	\$889	\$3,181	\$3,613	\$1,479	\$1,830	\$4,248	\$3,469	\$2,854	\$3,505	\$1,486	\$1,566	\$2,103	\$2,464
Total cost net revenue/mt	-\$738	\$38	\$11	\$36	\$320	\$75	\$82	\$50	\$98	\$82	\$72	\$72	\$72	\$50	\$152	\$55

14.3 All West Coast operations by vessel home port state

Table 14.5: Washington mean and median rates for West Coast operations. Mean and median revenue, costs, and net revenue (\$) per day and per metric ton (mt) harvested. ($N_{2009} = 16$, $N_{2010} = 17$, $N_{2011} = 16$, $N_{2012} = 15$, $N_{2013} = 15$, $N_{2014} = 17$, $N_{2015} = 16$, $N_{2016} = 16$).

Description	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Revenue/day	\$6,638	\$6,631	\$8,548	\$6,479	\$13,073	\$10,902	\$13,595	\$12,914	\$15,076	\$13,121	\$15,268	\$9,853	\$8,154	\$8,056	\$9,506	\$9,491
Revenue/mt	\$487	\$386	\$564	\$180	\$2,102	\$448	\$1,866	\$458	\$1,485	\$324	\$1,610	\$286	\$2,356	\$385	\$1,882	\$186
Variable costs/day	\$3,816	\$4,521	\$4,560	\$3,871	\$6,518	\$5,864	\$7,109	\$6,599	\$7,198	\$6,838	\$7,904	\$6,709	\$4,465	\$4,465	\$4,707	\$4,676
Variable costs/mt	\$308	\$228	\$356	\$109	\$974	\$238	\$955	\$228	\$609	\$182	\$1,010	\$185	\$1,253	\$212	\$844	\$105
Variable cost net revenue/day	\$2,822	\$2,206	\$3,988	\$2,608	\$6,555	\$6,289	\$6,486	\$6,029	\$7,878	\$6,673	\$7,364	\$3,893	\$3,689	\$3,507	\$4,799	\$4,763
Variable cost net revenue/mt	\$179	\$140	\$208	\$93	\$1,128	\$156	\$911	\$230	\$876	\$194	\$600	\$151	\$1,104	\$180	\$1,038	\$95
Fixed costs/day	\$2,242	\$1,655	\$2,105	\$1,359	\$3,827	\$1,989	\$4,837	\$2,623	\$3,120	\$2,438	\$3,889	\$1,519	\$1,657	\$1,113	\$1,416	\$1,236
Fixed costs/mt	\$159	\$93	\$172	\$45	\$406	\$193	\$471	\$174	\$398	\$59	\$499	\$50	\$436	\$74	\$179	\$35
Total cost net revenue/day	\$581	\$611	\$1,883	\$1,020	\$2,728	\$3,464	\$1,649	\$1,570	\$4,758	\$3,407	\$3,474	\$3,302	\$2,032	\$1,570	\$3,382	\$3,439
Total cost net revenue/mt	\$20	\$26	\$35	\$56	\$722	\$80	\$440	\$56	\$478	\$136	\$101	\$82	\$668	\$91	\$859	\$81

Table 14.6: Oregon mean and median rates for West Coast operations. Mean and median revenue, costs, and net revenue (\$) per day and per metric ton (mt) harvested. ($N_{2009} = 74$, $N_{2010} = 73$, $N_{2011} = 78$, $N_{2012} = 75$, $N_{2013} = 69$, $N_{2014} = 71$, $N_{2015} = 73$, $N_{2016} = 72$).

Description	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Revenue/day	\$5,494	\$4,704	\$5,871	\$4,602	\$8,885	\$7,606	\$7,883	\$6,317	\$10,013	\$9,127	\$9,007	\$8,865	\$7,955	\$8,670	\$8,341	\$8,253
Revenue/mt	\$1,130	\$1,027	\$1,123	\$961	\$2,130	\$1,338	\$2,161	\$1,241	\$2,017	\$1,381	\$2,333	\$1,332	\$2,492	\$1,650	\$2,551	\$1,742
Variable costs/day	\$3,128	\$2,555	\$3,599	\$2,770	\$4,688	\$3,972	\$4,800	\$3,966	\$5,327	\$4,824	\$5,506	\$4,896	\$4,708	\$4,729	\$4,715	\$4,473
Variable costs/mt	\$705	\$538	\$765	\$583	\$1,063	\$780	\$1,367	\$773	\$1,071	\$748	\$1,354	\$760	\$1,598	\$907	\$1,373	\$956
Variable cost revenue/day	net \$2,366	\$1,865	\$2,272	\$1,669	\$4,197	\$3,261	\$3,083	\$2,377	\$4,686	\$4,049	\$3,500	\$3,376	\$3,247	\$3,095	\$3,627	\$3,624
Variable cost revenue/mt	net \$425	\$370	\$357	\$342	\$1,067	\$545	\$795	\$488	\$946	\$607	\$979	\$608	\$894	\$694	\$1,178	\$778
Fixed costs/day	\$1,906	\$962	\$1,644	\$1,060	\$2,342	\$1,561	\$2,383	\$1,679	\$2,191	\$1,405	\$1,848	\$1,070	\$1,718	\$1,274	\$1,713	\$1,212
Fixed costs/mt	\$267	\$222	\$281	\$224	\$667	\$239	\$921	\$278	\$438	\$179	\$594	\$164	\$544	\$282	\$486	\$294
Total cost net revenue/day	\$459	\$692	\$629	\$533	\$1,855	\$1,501	\$700	\$698	\$2,495	\$2,434	\$1,653	\$1,964	\$1,529	\$1,806	\$1,914	\$2,132
Total cost net revenue/mt	\$159	\$136	\$76	\$120	\$400	\$231	-\$126	\$126	\$509	\$388	\$384	\$386	\$350	\$363	\$692	\$461

Table 14.7: California mean and median rates for West Coast operations. Mean and median revenue, costs, and net revenue (\$) per day and per metric ton (mt) harvested. ($N_{2009} = 38$, $N_{2010} = 36$, $N_{2011} = 36$, $N_{2012} = 37$, $N_{2013} = 33$, $N_{2014} = 30$, $N_{2015} = 24$, $N_{2016} = 23$).

Description	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Revenue/day	\$4,166	\$3,378	\$4,763	\$3,987	\$6,746	\$5,649	\$6,145	\$4,789	\$6,391	\$5,683	\$6,635	\$6,264	\$5,742	\$5,127	\$7,104	\$6,939
Revenue/mt	\$2,031	\$1,426	\$2,202	\$1,645	\$3,033	\$2,217	\$3,468	\$2,964	\$3,206	\$2,581	\$3,231	\$2,306	\$2,874	\$1,947	\$3,918	\$2,817
Variable costs/day	\$2,586	\$2,416	\$2,743	\$2,524	\$4,086	\$3,444	\$3,732	\$3,322	\$3,823	\$3,338	\$4,192	\$3,779	\$4,133	\$3,924	\$4,367	\$4,126
Variable costs/mt	\$1,780	\$923	\$1,225	\$954	\$2,701	\$1,382	\$2,374	\$1,674	\$1,993	\$1,379	\$2,069	\$1,312	\$2,346	\$1,411	\$2,201	\$1,510
Variable cost revenue/day	\$1,580	\$1,159	\$2,020	\$1,422	\$2,660	\$2,446	\$2,412	\$1,985	\$2,568	\$2,628	\$2,443	\$2,434	\$1,609	\$1,857	\$2,738	\$2,764
Variable cost revenue/mt	\$250	\$559	\$977	\$577	\$332	\$825	\$1,094	\$768	\$1,212	\$869	\$1,162	\$720	\$528	\$707	\$1,718	\$1,102
Fixed costs/day	\$1,064	\$902	\$1,021	\$752	\$2,293	\$1,228	\$2,254	\$1,351	\$1,361	\$942	\$1,212	\$719	\$1,055	\$932	\$1,329	\$1,022
Fixed costs/mt	\$766	\$461	\$465	\$313	\$2,736	\$471	\$2,398	\$773	\$626	\$426	\$466	\$302	\$646	\$363	\$870	\$481
Total cost net revenue/day	\$516	\$280	\$999	\$607	\$368	\$1,169	\$158	\$687	\$1,207	\$1,269	\$1,231	\$1,571	\$554	\$1,081	\$1,408	\$2,098
Total cost net revenue/mt	-\$515	\$94	\$512	\$248	-\$2,404	\$431	-\$1,304	\$252	\$587	\$483	\$696	\$506	-\$118	\$368	\$848	\$682

Cost Disaggregation

In order to conduct economic analyses of specific fisheries it is important to have costs broken out by fishery. However, vessels participating in multiple fisheries incur costs that are aggregated across fisheries. These are called joint costs in the economics and accounting literature. They may include fixed costs (e.g., a new engine), or variable costs (e.g., fuel). The former are joined by the nature of the costs, while the latter are joined due to observational limitations. It is difficult to assign fixed costs to a particular fishery because the level of the cost does not vary with vessel participation (at least over the short run).

Some variable costs can be tracked by fishery, but would be costly to do so. For example, although a vessel could theoretically set up a system to track fuel expenditures by fishery, doing so is rare among the EDC catcher vessels. Moreover, some types of fuel use are inherently (by their nature) difficult to allocate, even if they are tracked. An example is a vessel that fishes both on the West Coast and in Alaska. It is not obvious what proportion of the fuel consumed while steaming between the fisheries should be allocated to the West Coast.

There are three variables available for cost disaggregation: 1) weight of shoreside landings and at-sea deliveries, 2) value of shoreside landings and at-sea deliveries, and 3) days at sea. These variables are applied to all cost types collected by the EDC Program. Fuel, crew payments, and captain payments are treated differently because the EDC Program collects additional information about these costs. Vessels report the average fuel use (gallons) per day by fishery and so we can calculate the total gallons per fishery and then allocate costs accordingly. As previously described, crew and captain payments are calculated as a share of net revenue. In order to allocate wages to individual fisheries, we use information about what costs are deducted before calculating crew wage to calculate fishery-level net revenue and then allocate crew and captain payments accordingly.

Use of these methods requires data from various sources. The total weight and ex-vessel revenue from shoreside landings are obtained from fish ticket data. The total weight of at-sea deliveries is obtained from A-SHOP data, and the ex-vessel revenue from at-sea deliveries is obtained from EDC data. The days at sea are also obtained from EDC data. Landings and days at sea are allocated to specific fisheries using the methods described in Section 3: Vessel Participation on the West Coast and in Alaska.

Alaska landings and revenues obtained from EDC data were appended to the information extracted from the West Coast fish ticket data. This was only done for operators who also operated the vessel on the West Coast. If a vessel only participated in Alaska fisheries, the data were excluded from the analyses. If a vessel fished in Alaska, but the operator of the vessel was different from the operator on the West Coast, the Alaska portion was also excluded.

If the vessel was operated by more than one company during the fiscal year, the range of dates that are used to pull the fish ticket records is adjusted. There are two cases when this would occur: the vessel was leased to a different operator, or the vessel was sold mid-year to another company. In cases where the vessel was sold mid-year, information from the Permit Office must be obtained to determine when the vessel was transferred to a new company. Although both the Coast Guard and the Permit Office track vessel ownership information, we use the Permit Office data as the authoritative source for this information. When the vessel transfers ownership, a new record is made in the Permit Office database and so the dates of operation of the multiple companies can be determined and used as the range of dates for pulling the fish ticket records. Occasionally, the paperwork for vessel sales lags with the change in operation, additional information provided by the participant on the form or other communications is used to adjust the fiscal year used to calculate total revenue to best correspond with the information provided on the form. If the vessel was leased by the owner of the vessel, then the lease dates provided on the EDC form are combined with the fiscal year data to pull the fish ticket records.

Once the total revenues from shoreside landings is calculated, it is then added to the other revenue categories provided on the forms to generate the total revenue. Landings of species associated with zero revenue were excluded entirely from the cost disaggregation analyses.

Listed below are the variables used to disaggregate each cost category for reporting purposes, we refer to this as the “mixed” method:

- Costs were disaggregated using ex-vessel revenue for the following cost categories:
 - Capitalized expenditures
 - Travel
 - Fishery association dues
 - Fees
 - Vessel and on-board equipment.
- Costs were disaggregated using at-sea deliveries and shoreside landings weight for the following cost categories:
 - Bait (only aggregated to non-trawl fisheries)
 - Offload fees
 - Trucking expenses
 - Fishing gear.
- Costs were disaggregated using days at sea for the following cost categories:
 - Food
 - Ice
 - Insurance
 - Other supplies
 - Communications
 - Lease of the vessel
 - Moorage.

- Fuel costs were disaggregated using gallons of fuel.
- Crew and captain payments were disaggregated using net revenue.

To understand the potential implications of the assumptions associated with the four methods of cost disaggregation, the output of the different methods were examined by looking at the effect on average total cost net revenue on the West Coast. Total cost net revenue by cost disaggregation type are presented in Tables A.1 (cost disaggregation using ex-vessel revenue), Table A.2 (cost disaggregation using at-sea deliveries and shoreside landings), Table A.3 (cost disaggregation using days at sea) and A.4 (cost disaggregation using "mixed method").

Using landings and delivery weight resulted in allocating the largest variable and fixed costs to the West Coast than any other method and therefore, the lowest total cost net revenue. The days at sea method resulted in the highest total cost net revenue. Although the different methods resulted in different allocations of costs, Figure 82 shows that there were no major differences between the methods.

Table A.1: Net revenue using ex-vessel revenue for cost disaggregation. Total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue (thousands of \$) for all participation in the West Coast groundfish trawl catch share program using ex-vessel revenue to disaggregate costs from other fisheries (N = number of EDC vessels with non-zero, non-NA responses).

	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Revenue	\$307	125	\$363	122	\$584	112	\$528	110	\$639	104	\$653	101	\$499	96	\$600	96
(Variable costs)	(\$168)	125	(\$197)	122	(\$283)	112	(\$289)	110	(\$312)	104	(\$346)	101	(\$270)	96	(\$298)	96
Variable cost net revenue	\$139	125	\$166	122	\$301	112	\$239	110	\$327	104	\$307	101	\$228	96	\$302	96
(Fixed costs)	(\$91)	125	(\$101)	122	(\$142)	112	(\$145)	110	(\$128)	104	(\$132)	101	(\$87)	96	(\$99)	96
Total cost net revenue	\$48	125	\$65	122	\$159	112	\$94	110	\$199	104	\$175	101	\$141	96	\$203	96

Table A.2: Net revenue using at-sea deliveries and shoreside landings for cost disaggregation. Total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue (thousands of \$) for all participation in the West Coast groundfish trawl catch share program using at-sea deliveries and shoreside landings to disaggregate costs from other fisheries (N = number of EDC vessels with non-zero, non-NA responses).

	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Revenue	\$307	125	\$363	122	\$584	112	\$528	110	\$639	104	\$653	101	\$499	96	\$600	96
(Variable costs)	(\$188)	125	(\$215)	122	(\$301)	112	(\$304)	110	(\$342)	104	(\$367)	101	(\$279)	96	(\$327)	96
Variable cost net revenue	\$119	125	\$148	122	\$282	112	\$224	110	\$296	104	\$286	101	\$219	96	\$273	96
(Fixed costs)	(\$117)	125	(\$123)	122	(\$169)	112	(\$164)	110	(\$152)	104	(\$152)	101	(\$98)	96	(\$125)	96
Total cost net revenue	\$2	125	\$24	122	\$114	112	\$60	110	\$144	104	\$134	101	\$121	96	\$148	96

Table A.3: Net revenue using days at sea for cost disaggregation. Total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue (thousands of \$) for all participation in the West Coast groundfish trawl catch share program using days at sea to disaggregate costs from other fisheries (N = number of EDC vessels with non-zero, non-NA responses).

	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Revenue	\$307	125	\$363	122	\$584	112	\$528	110	\$639	104	\$653	101	\$499	96	\$600	96
(Variable costs)	(\$169)	125	(\$195)	122	(\$276)	112	(\$280)	110	(\$323)	104	(\$342)	101	(\$258)	96	(\$288)	96
Variable cost net revenue	\$138	125	\$168	122	\$308	112	\$248	110	\$315	104	\$311	101	\$241	96	\$312	96
(Fixed costs)	(\$90)	125	(\$103)	122	(\$135)	112	(\$143)	110	(\$128)	104	(\$129)	101	(\$86)	96	(\$103)	96
Total cost net revenue	\$48	125	\$65	122	\$173	112	\$105	110	\$187	104	\$182	101	\$154	96	\$210	96

Table A.4: Net revenue using the mixed method for cost disaggregation. Total revenue, variable costs, variable cost net revenue, fixed costs, and total cost net revenue (thousands of \$) for all participation in the West Coast groundfish trawl catch share program using the mixed method to disaggregate costs from other fisheries (N = number of EDC vessels with non-zero, non-NA responses).

	2009		2010		2011		2012		2013		2014		2015		2016	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Revenue	\$307	125	\$363	122	\$584	112	\$528	110	\$639	104	\$653	101	\$499	96	\$600	96
(Variable costs)	(\$170)	125	(\$199)	122	(\$284)	112	(\$287)	110	(\$319)	104	(\$348)	101	(\$270)	96	(\$298)	96
Variable cost net revenue	\$137	125	\$164	122	\$300	112	\$241	110	\$320	104	\$306	101	\$229	96	\$302	96
(Fixed costs)	(\$97)	125	(\$108)	122	(\$150)	112	(\$150)	110	(\$132)	104	(\$132)	101	(\$88)	96	(\$102)	96
Total cost net revenue	\$39	125	\$56	122	\$150	112	\$91	110	\$188	104	\$174	101	\$141	96	\$200	96

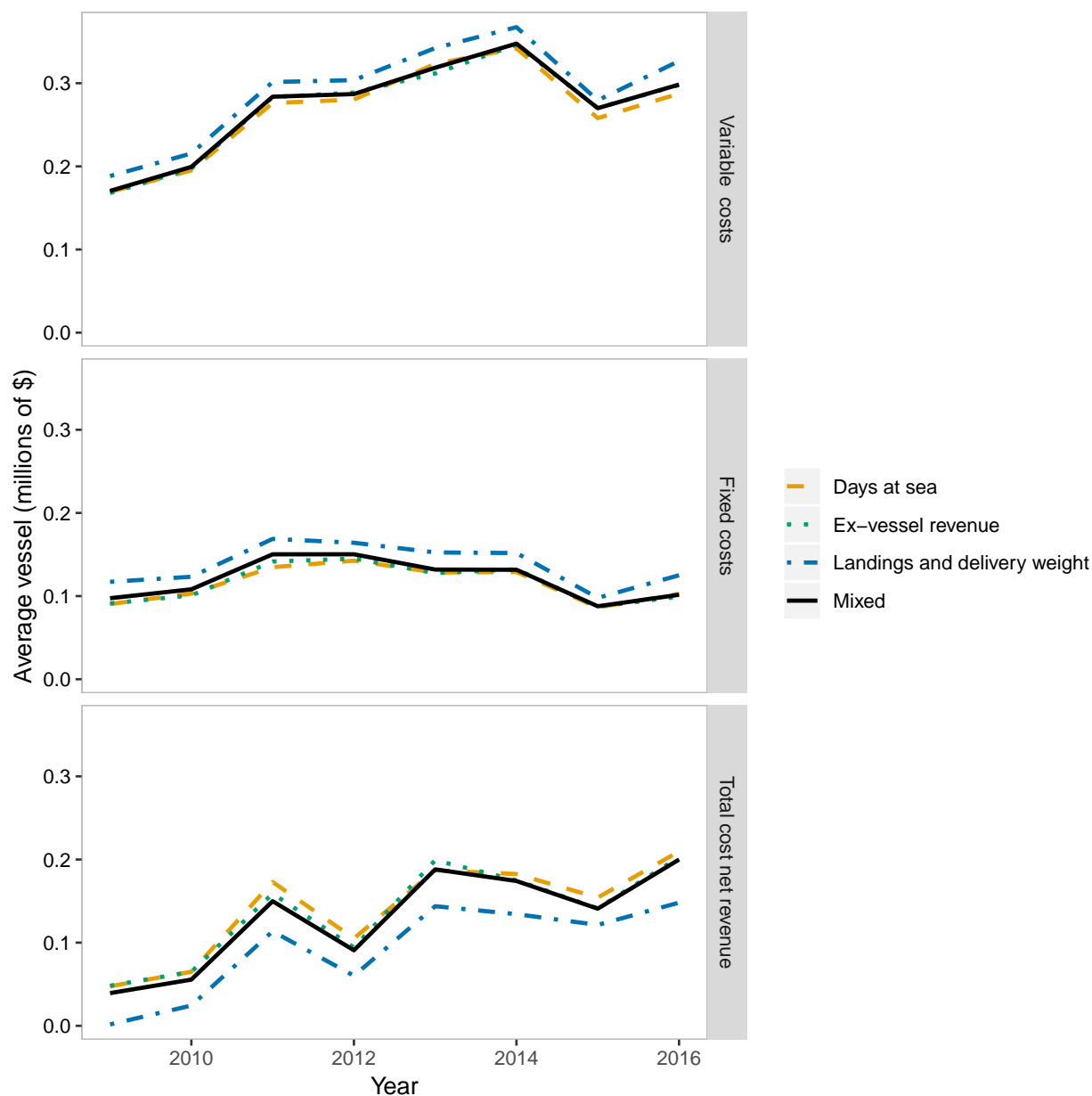


Figure 82: Sensitivity analysis for cost disaggregation methods. Sensitivity analysis of cost disaggregation methods on total cost net revenue for vessel operations in the catch share program (whiting and non-whiting groundfish). The four methods are disaggregation by landings and delivery weight, days at sea, ex-vessel revenue, and “mixed” where costs are disaggregated by one of the three methods depending on the type of cost, see page 212.